VOL. 76 No. 26

Engineering News

December 28, 1916
Two Sections--Section No. 2

A JOURNAL OF CIVIL ENGINEERING AND CONSTRUCTION

ISSUED WEEKLY

VOLUME LXXVI

June 1 to December 31, 1916

HILL PUBLISHING COMPANY
HILL BUILDING
10TH AVENUE AT 36TH STREET
NEW YORK

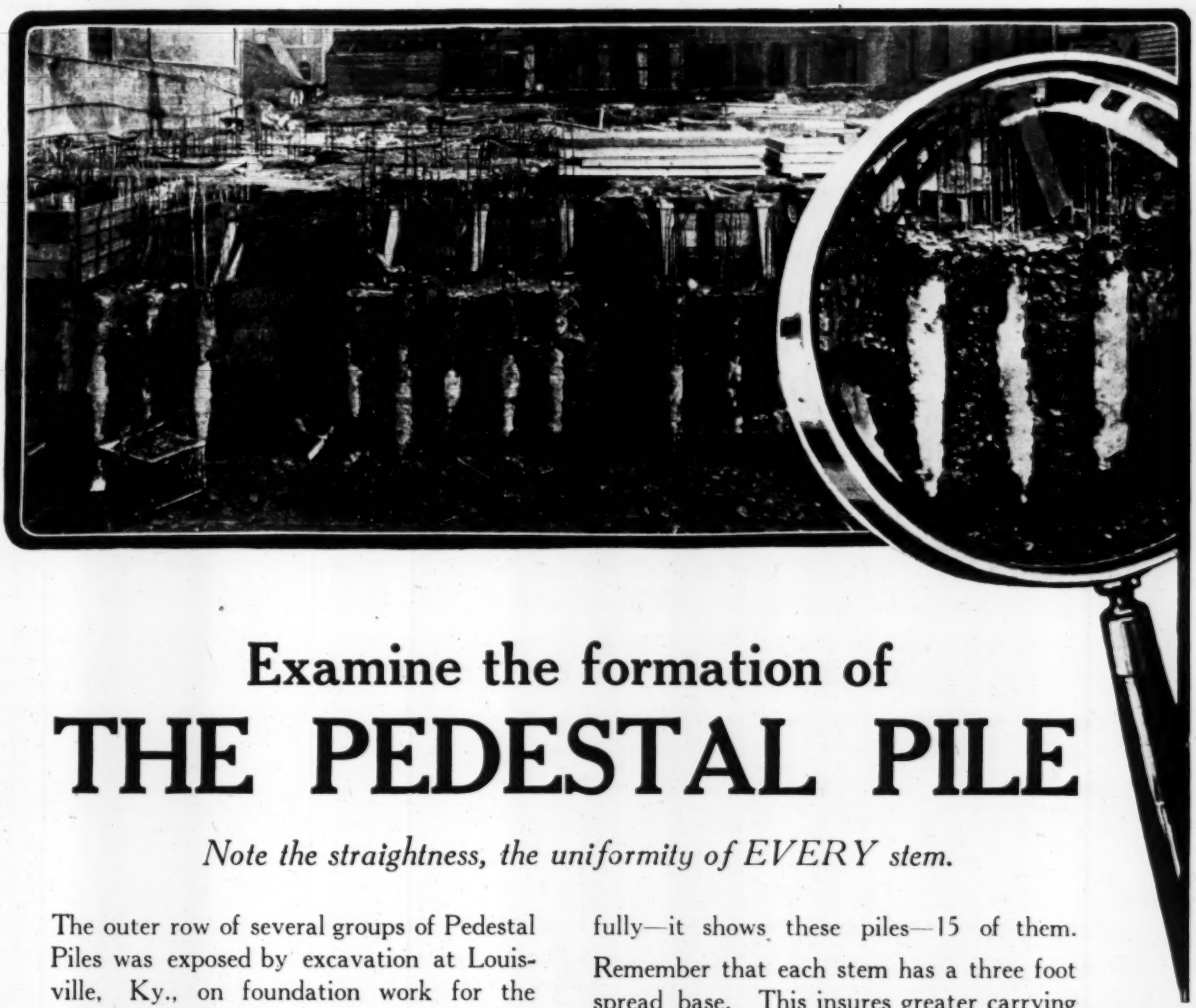
1916

Engineering News

Volume 76, No. 1
Issued Every Thursday
Hill Publishing Company

NEW YORK, JULY 6, 1916

Price, 15 Cents
Contents, First Page
Advertising Index, Last Page



Examine the formation of

THE PEDESTAL PILE

Note the straightness, the uniformity of EVERY stem.

The outer row of several groups of Pedestal Piles was exposed by excavation at Louisville, Ky., on foundation work for the Louisville Gas and Electric Co.

Scrutinize the above photograph carefully—it shows these piles—15 of them.

Remember that each stem has a three foot spread base. This insures greater carrying capacity per pile. Hence—

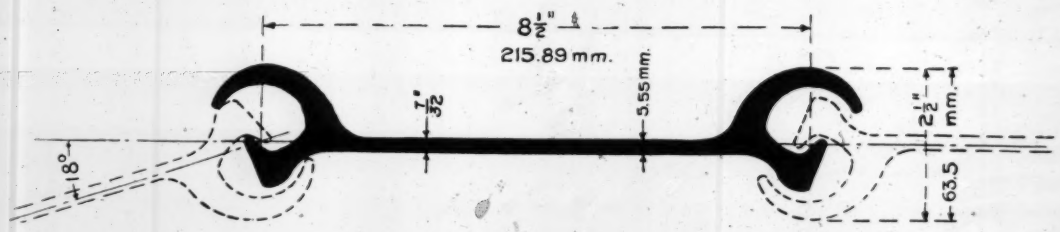
Less cost per foundation.

How the Pedestal Pile is made—what it has done—fully described in 64-page handbook N. Write for your copy now.

MacArthur Concrete Pile and Foundation Company, 120 Broadway, N. Y. City

Chicago San Francisco Montreal Boston New Orleans Atlanta Detroit Cleveland Cincinnati

8½-Inch—The New Section of Lackawanna Steel Sheet Piling



WEIGHT.		TRANSVERSE STRENGTH.		MODULUS OF SECTION.	LEAST RADIUS OF GYRATION
LBS PER SQ FT.	LBS PER LIN. FT.	PER SINGLE SECTION.	PER INCH OF WIDTH.	AVERAGE SECTION MODULUS PER HORIZONTAL FOOT OF WALL INTERLOCKED IN PLACE.	
20.75	14.698	1.100 $In.^3$	0.1294 $In.^3$	1.553 $In.^3$	0.509 In.
PER SQ METER IN KILOGS.	PER LIN. METER IN KILOGS.	PER SINGLE SECTION.	PER CENTIMETER OF WIDTH.	AVERAGE SECTION MODULE PER HORIZONTAL METER OF WALL INTERLOCKED IN PLACE.	LEAST RADIUS OF GYRATION.
101.314	21.873	18.024 $Cm.^3$	0.835 $Cm.^3$	83.478 $Cm.^3$	1.293 Cm

THE addition of this new Straight-Web section fills the one gap in our already large number of types and sizes, and on certain medium and light trench work, cofferdams, retaining walls, etc., gives users of Lackawanna Steel Sheet Piling a little more economical sheeting than was heretofore obtainable.

The efficiency of this pile (considering that the load will be in proportion to the width of the pile, also considering the high transverse strength and low weight of the pile) is *very high* per pound of metal.

All the other good qualities—simple, flexible, watertight interlock with minimum driving and pulling friction—will be found in this section in the same degree as has made the Lackawanna product supreme.

Further information and advice concerning special uses for this new 8½-inch section will gladly be furnished by our Steel Sheet Piling Engineers.

Managing Engineers should also send for our book "Lackawanna Steel Sheet Piling."

LACKAWANNA STEEL COMPANY

General Sales Office and Works: Lackawanna, N. Y.

NEW YORK
BOSTON
BUFFALO
PHILADELPHIA
CLEVELAND
CINCINNATI
CHICAGO
DETROIT
ST. LOUIS
ATLANTA
SAN FRANCISCO

Licensees for the manufacture of Lackawanna Steel Sheet Piling:
For Great Britain and British Colonies in the Eastern Hemisphere, Cargo-Fleet-Iron Co., Ltd., Middlesbrough, England. For France, Italy, Spain, French Colonies and Protectorates, Italian Colonies and Spanish Colonies in the Eastern Hemisphere: Cie Des Forges & Aciéries de la Marine et d'Homécourt, Paris, France.

ENGINEERING NEWS

INDEX TO VOLUME LXXVI

June 1 to December 31, 1916

Subdivided into GENERAL (including AUTHORS,) ENGINEERING LITERATURE AND CONTRACT PRICES

Explanatory Note

This index follows, generally, the methods adopted and more fully explained with the index for Volume 71. An asterisk (*) indicates an illustrated article, and (n), (ns), note, notes. As such are designated the articles under "Appliances and Materials" and some of the briefer ones under "News of the Engineering World," although in large type. Letters are not distinctively specified, nor are editorials usually. An editorial referring to an article may be indexed by appending the page number.

Following is a list of the pages included in the several numbers of this volume, by date:

July	6	pages	1-48
"	13	"	49-96
"	20	"	97-144
"	27	"	145-192
Aug.	3	"	193-240
"	10	"	241-288
"	17	"	289-336
"	24	"	337-384
"	31	"	385-432
Sept.	7	"	433-480
"	14	"	481-532
"	21	"	533-580
"	28	"	581-628
Oct.	5	"	629-676
"	12	"	677-724
"	19	"	725-772
"	26	"	773-820
Nov.	2	"	821-868
"	9	"	869-916
"	16	"	917-964
"	23	"	965-1012
"	30	"	1013-1060
Dec.	7	"	1061-1108
"	14	"	1109-1156
"	21	"	1157-1204
"	28	"	1205-1248

A

Page

Abbe, C., Jr. Evaporation studies.....*200
Aberthaw Const. Co.'s inquiry on building vibration 624
Abrams, D. A. Concrete-wear tests..... 135

ACCIDENTS
See also "Flood," "Fire."
—Aqueduct, Winnipeg, cracks..... 716
—Boom falls on roofs, Los Angeles.....(n) 285
—Bridge, Cleveland, wrecked by runaway car, 711, *718, (n) 1058
—Bridge crippled by wind, Kankakee Riv....*638
—Bridge curiosities, County.....*754
—Bridge failures, Mich. Thomas..*455, (n)*804
—Bridge, Old iron, Dixon, Ill., damaged by elec. car *357
—Bridge, Quebec, suspended span collapses 513, *524, 561, 563, *572, 575, 622, *650, 661, 709, 760, *857, *1191, (n) 664
—Bridge, Quincy, Mass., highway, wrecked by concrete mixer.....(n) 866
—Bridges flood-wrecked, Catawba Riv. *184, 1233, (ns) *560, 756
—Bronze-bolt breakage drops gate counterweight, Panama.....998, 1147
—Building—Atlanta skating-rink roof-arch collapse, etc.....*70, 83, *515
—Building—Concrete floor falls after early removal of forms, N. Y.....*1050, (n) 1106
—Building—Fire or explosion wrecks part of Mullen & Buckley concrete warehouse, Far Rockaway, N. Y.....*956
—Building, Shop, of Roxbury school—Flat-slab floor failure due to poor brick wall columns *262, 614
—Building—Tenement under construction collapsed, Bronx, N. Y.....(n) 430
—Buildings, Brick, collapse, Boston.....(n) 913
—Canal-lining slide, Turners Falls..*1031, 1046
—Cave-in, Gravel-bank, Barton, Ala.....(n) 913
—Cave-ins, Scranton mine.....276, *280, *681
—Caving, English salt mines.....(n)1085
—Chimney settlement kills men, Corning, N. Y., glass works.....(n) 190
—Cleveland water-tunnel explosion 187, 236, 380
—Coal-mine explosion, Roden.....(n) 913
—Coffer-dam fails, Earth-fill, Bost. dry-dock, 237, (n) 429
—Dam fails, Charleston Lt. & Water.....*232
—Dam fails, Lake Toxaway..... 331
—Explosion, Chloride of potash, Univ. of Ill. lab..(n) 320
—Explosion, Munitions, N. Y. harbor *236, Safeguarding cities from explosion disasters 275
—Gas explosion wrecks Kan. church.....(n)*660
—Grain separators, Explosions in..... 563

ACCIDENTS—Continued
—Prize-fight seat-stand collapse, Colo. Springs .....(n)*578
Railways:
Boston surface car through draw 952, (ns) 913, 1011
Grade-crossing foolhardiness..... 854
Grand Trunk grade-crossing accident, Detroit .....(n) 674
Johnstown, Surface-car collision near (n) 333
N. Y. subway timbering collapse, Bklyn.; trolley car falls in.....(n) 110
St. Louis, Iron Mtn. & So. freight-train wreck .....(n) 674
Southern loco.-axle break report.....(n) 913
Western Md.—Rail breaking after 10 years wrecks train.....366, (n) 332
—Reservoir failure, Winfield, Kan.....*404
—Reservoir wall tips, Madison.....*476
—Shovel strikes bridge, Cleveland.....(n)*274
—Stack, Broken boom drops.....*618, (n) 530
—Tunnel-face blowout, Boston Edison....44, 285
—Typhoid from water, accident..... 442
—Water-filter arch collapse, Cleveland *186, (ns) 141, 1009, Foundation settlement, 1095, *1099, 1150
—Water-main breaks—Bayonne (n) 141, Baltimore (n) 674, Pittsburgh (n) 674, Minneapolis .....(n)1057

Accounting, Accurate cost, for Govt. industries 83
Accounting—Contractors' daily records *897, *994
Accounting, Depreciation in. Hurley....(n) 59
Accounting—Radebaugh tunnel-repair progress record 124
Acoustics, Elementary, for outdoor speaking. 178
Activated and plain sewer sludge, Nitrogen from; Milwaukee studies. Copeland 665, Ed 663, Fuller..... 667
Activated sludge, Am. Soc. Mun Impvts' on 767
Activated sludge, Chi. stockyards (ns) 427, 1202
Activated-sludge expts., London.....(n) 37
Activated-sludge expts., University of Ill.; plant at Champaign, etc. Bartow, Mohlman, Schnellbach *972, Air diffusion..... 110
Activated sludge in India.....(n) 624
Activated sludge, Matawan, N. J.....(n) 140
Activated-sludge patent correspondence requested .....(n) 617
Activated-sludge plant, Hermosa Beach, Calif. 380, Broslus *890
Activated-sludge plant, Milwaukee.....*686, 856
Activated-sludge progress 366
Activated-sludge results, Cleveland, reviewed. Pratt, Gascoigne.....*1061, *1124, (n) 110
Activated-sludge tanks, Air-diffuser experiences with—Baltimore; Milwaukee; Brooklyn; Chicago; Houston; Cleveland; Ill. Water Survey 106, Baltimore..... 267
Adams Co., Ind., bridge plans.....*471
Aërial tramway. See "Cableway."
Aëro. motor, Knox Co's Trego 300-hp..(n)*1108
Aëroplane for city planning.....(n) 464
Agitation, Mechanical, of sewage unsuccessful. Nordell 856
Agler bridge near Columbus.....*1109
Agnew Lake dam.....*1159
Air chamber protects venturi meter from pulsations *1184
Air, Compressed, regulations, Milwaukee sewer contractor's .....(n)1236
Air-compressing outfit, Zin-Ho portable, with Gardner-Rix type compressor.....(n)*192
Air concreting. Graham.....*386
Air-diffuser experiences with activated-sludge tanks, various cities (See also "Sewers"), 106, 267
Air, Economizing compressed, Milwaukee intake tunnel .....(n)1041
Air-hammer drill tests, Chi. Pneu. Tool Co., (n) 708
Air-hammer tools, Rock tunneler using *340, 365
Air hoist, "Little Tugger".....(n)*724
Air lift—Chi. "Baker" injector.....(n)*384
Air-lift pumping, El Paso.....*204
Air lifting jack, Baird.....(n) *48
Air paint gun, Spray Eng. Co.'s.....(n)*676
Air roughing tool, Gardner.....(ns) 288, *628
Air, Tunneling in firm clay with compressed, Cleveland *1220
Alaska—Rainfall of 142 in. Dow.....(n)*756
Alaskan railroads—Progress 672, Stationmen system succeeds *995, Leveling experience *1037
Albany, N. Y.—Building sewage pump house and grit chamber. Vernon *738, Municipal dock .....(n) 540
Albany Soc. Civ. Eng.—Concrete symposium 864, Discusses sand..... 949
Albany, Ore.—Pavement costs..... 103
Alberta gas-export prohibition.....(n) 286
Alderson, G. F. Dynamiting well.....1137
Allegheny bridges, Raising of..... 427

Allen, K. Heavy rainfall.....1001
Allison, L. R. Erecting transmission towers.*752
Alloys. See also "Bronze."
Alloys, High-pres. fitting. Sleeth.....(n)1092
Alpha Portland Cement Co.....(n)1197
Alum, coagulant, Springfield, Mass..... 617
Alum in Toronto filtration.....*566
Alum manufacture, Kingston-on-Thames municipal 261
Alum at Council Bluffs.....*456
Alum, Montreal Water Co. makes its..... 477
Alum to iron, Changing from, at Clarksburg filters. Boynton 927
Aluminum bronze, Strong. Corse, Comstock. 87
Aluminum Co. of Am.—Yadkin development *917, 951, Barge transportation.....(n) 817
Alvord, J. W. Water purification safer than sewage treatment 1237
American Asso. of Engineers 862, (ns) 143, 191, 772
American Asso. Port Authorities..... 623
American Can Co.'s tank.....*693
American Chemical Soc. sanitary division meeting 673, Nitrogen from sewer sludge, 663, 665
American Concrete Inst. placed on sound basis 902
American Elec. Ry. Asso. convention 762, (n) *996, Rail head *418, Standardizing valuation terms 787
American Highway Asso.—Review of legislation 1143, Road-material costs.....(n) 886
American Highway Officials Asso.....1202
American Inst. Elec. Engineers—Appraisal and depreciation discussed..... 962
American Inst. Mining Engineers 271, (ns) 287, 577, 1107
American International Corp. report—Engineers developing foreign trade.....1197
American Internatl. Terminal Co.....(n) 94
American Mining Congress and conservation 1144, Holmes memorial.....(n)1009
American Public Health Asso. 831, 858, 859, Sewage-disposal code 876, 901, Terms 858, 955
American Ry. Asso.—Crossing signals 285, Daylight saving 1044, (n) 1058, Preparedness to transport troops.....(n)1011
American Ry. Bridge & Bldg. Asso. 816, 849, (ns) 675, 900, 950
American Ry. Eng. Asso.—Track spike.....*1215
American Road Builders' Asso.....(n) 915
American-Russian Chamber of Commerce... 177
American Soc. Civil Engineers—Materials an active field 33, Flood-control report comment. Dabney 370, Enlarging Engineering Societies Building 425, Relation to local sections 806, Meeting attendance (n) 46, Nominations (n) 915, Tex. Asso. discusses license law 864, Political action by members. Dabney 1001, Detroit Asso. (n) 915, Pittsburgh Asso.....(n) 915
American Soc. Mechanical Engineers (ns) 95, 867, Boiler code. Hess, Q. E. D. 278, Code adoption (ns) 735, 914, Pays off debt 612, New London excursion (n) 964, Mechanical-filter standards 1148, Meeting report—Breaks record 1152
American Soc. Municipal Impvts.—Asphalt tests. Smith 205, 416, Forrest 209, Convention; papers.....766, 855, 938
American Soc. Testing Materials—Activity at meeting 33, Meeting report—Committee work 38, Cement specification 35, 43, Meaning of "concrete" 81, Abstracts of papers 87, *135, (n) 286, Meeting registrations (n) 46
American steel-dredge design and erection costs *6
American Tool Wks. Co.'s plant *991, (erratum n) 1193
American Water-Wks. Asso.—Broader vision—Electrolysis and fire protection 33, Paper 104, Iowa and Ill. sections 791, 1017, (ns) 383, 675, 769, 1091, N. Y. section 813, Four-states meeting, Wilmington, Del.....1008
Anchor-bolt holes drilled by gasoline-air outfit, N. Y. Edison transmission line. Hicks *54
Anson-Madison water-supply *542
App rock-tunneling machine.....*340, 365
Applications for employment—Notepaper defended 37, Experience with applications. Bock, of Morgan Eng. Co. 258, How not to apply for job..... 275
Appraisal. See also "Valuation," etc.
Appraisal discussed by A. I. E. E..... 962
Appraisal, Post-mortem, of industrial plant, Traders Paper Board Co.'s Higgins....*600
Appraisals for rate making, Obsolescence in. Harshman 842, 854

AQUEDUCTS
See also "Water" topics, "Pipe," "Hydraulics," "Canals," etc.
—Catskill:
Bronze failures.....998, 1147

306798

Page

AQUEDUCTS—Continued
Kensico dam quarries. Smith.....*250
Narrows siphon, Connecting, to Staten Isl. main *782
Tunneling grouting in Brooklyn end. Myers.*196
Tunnel, 18-mile rock.....*1008
Williams' report—When surplus changes to deficit 367
—Coolgardie water conduit.....(n) 680
—Montreal aqueduct combined bridge and headgates 427
—Winnipeg aqueduct cracks from foundation settlement 716

Arch bridge, Concrete, near Columbus.....*1109
Arch bridge, Concrete, Susquehanna *385, *764
Arch centers suspended from old plate girders, Millburn concrete bridge, D., L. & W.....*846
Arch, Concrete—Thacher pat. cases 44, 621, 661
Arch construction, Iron culverts for, Ariz...*330
Arch-crown thickness, New formula for. Schwada *880
Arch floor, Groined, Sioux Falls reservoir..*840
Arch, Groined, collapse, Cleveland filter *186, (ns) 141, 1009
Arch, Popolopen steel.....*337
Arch, Roof, collapse, Atlanta rink, etc. *70, 83, *515
Architect, U. S. Supervising—Office may be superseded (n) 139, Plan abandoned..(n) 190
Areas, Short method of calculating 4-sided. Averill *1186
Arizona—Iron culverts for road-arch construction *330, Melted snow supplies arid district *435, 467, Roads.....482, *484
Armor-plate plant—Cost accounting..... 83
Armory, Building foundations 150 ft. under Scranton *681
Armour activated-sludge plant..... 110
Army. See "War," "U. S."
Arroyo crossings, desert roads.....*485
Artillery service, Field, should attract engineers; gun-pointing problems, etc. McCullough 353, Gregg.....*564
Artistic portals, Pittsburgh bridge....1238, *1242
Artistic touches for simple water-wks. structures, Mass.....*433, (n) 616
Ashes, garbage and rubbish, Analytical study, Dist of Col. Osborn.....294, *348
Ashland, Wis.—Ore dock. King.....*242
Ashley, B. J. Sewage treatment, Cook Co., Ill., institutions *296
Ashpits, Fireproof *635
Asphalt. See also "Pavements," "Streets," "Roads."
Asphalt, Bituminous-materials tests for sheet; A. S. M. I. specifications. Smith 205, 416, Forrest 209
Asphalt-joint filling machine, San Bernardino Co., Calif. Bright.....*851
Asphalt-mixing plant, Self-propelling, Municipal Eng. & Con. Co.'s.....(n)*868
Asphalt-pavement costs with municipal plant, Spokane. Cunningham 375
Asphalt pavements, Low-priced, Burlingame, Calif. Wold .....(n) 715
Asphalt-paving history 434, Patents. Hohl 761, Richardson 1001
Asphalt paving, Rough-surface Mass *1141, 1162
Asphalt specification should be adopted, Standard. Draney 278, Durham..... 416
Asphalt use increasing—Diagram of production since 1880.....*307
Assessing paving cost among property owners, Owensboro, Ky. Talbott..... *14
Assessment, Paving-cost, at street intersection, Middleboro, Ky.....*801
Assessments, Method of making drainage and improvement. Cupper 975
Asso. Iron & Steel Elec. Engineers..... 169
Asso Railway Elec. Engineers....*1134, (n) 915
Astoria, Ore.—Viaduct vs fill. McClean 325, Municipal docks. Newell.....*697
Atlanta, Ga.—Roof-arch collapse *70, 83, 515, New railway terminals planned *715, Water-wks. impvts.....(n) 1202
Atlantic Deeper Waterways Asso.....(n) 579
Auditorium, Phila. municipal.....*188
Auditoriums, Outdoor—Acoustics 178
Aurora, Ill.—Water-supply *1122
Austin, Tex.—Dam—Section criticized. Bartlett & Ranney 217, Wegmann to report (n) 333
Australian thin arch dam. Nimmo.....*712
Australian Transcontinental Ry.....(n) 286
Automobile. See "Motor vehicles."
Averill, C. K. Calculating 4-sided areas...*1186
Axle-break report, So. Ry.....(n) 913
Axle, Water-quenched, equal to oil-quenched—P. R.R tests. Young..... 88
Azimuth, Fieldbook sheet for, McClintock's *363, Simple azimuth determinations. Finch.1139

B

Babcock, C. D. Turbine-speed diagram.....*707
Bacharach pocket CO_2 indicator.....(n)*916
Backfiller trimming reservoir slope.....(n)*1042
Backfilling machine pulls sheetpiling.....(n)*175
Baebenroth, A. C. Business letters.....1046
Bag stacker, Jeffrey.....(n)*1108
Bailey, F. S. Stirrup-spacing diagrams.....*694
Baird, H. C. Que. bridge accident..... 857
Baird, S. P. Earth shrinkage..... 850
Baker concrete-road finisher.....*1083
Baker, Ore.—Street flushing.....*659
Balcony brackets, Taking care of eccentric loads from, Huntington high school.....*763
Ball, M. W. Conservation.....1144
Ballard, F. W. Cleveland municipal lighting-plant results 603
Ballast, Cleaning old, Kan. Cy. Rys.....(n)1236
Ballast tampers. See "Tampers."

BALTIMORE, MD.
—Activated-sludge air diffusers. Hendrick, Frank 106, 267
—Concrete mixing plant, Central. Carpenter.*268
—Imhoff tank foams. Potts.....*469
—Rail head, Elec.-railway.....*418
—Sewerage system, Completion of—Treatment works; Jones Fallsway. Requardt.*736
—Water-Dept. organization *790
—Water mains, Finding leaks and weaknesses in 991

Bar-bending machine, Hinman.....(n)*144
Barbour, F. A. Water losses.....958, 960, 951
Barbour, P. E. Ponton bridges.....*156
Barge, Contractors' stern-wheel gasoline. O'Connell .....(n) 128
Barge transportation, Miss. Riv.....(n) 817
Barges, Concrete, Panama, stand test 927, Others elsewhere.....(n) 625
Bark, D. H. Idaho irrigation..... 19
Barker, H. Que. bridge accident *524, Depreciation problems 1167, 1212
Barnett, R. C. Govt. and student free engineering service 36
Barrel elevator, Chain Belt, for Standard Oil Co. .....(n)*820
Barrel loader, Jeffrey.....(n)*1108
Barrels, Standard-capacity lime.....(n) 696
Bartlett, T. Sewage disposal by broad irrigation *586
Bartlett & Ranney. Austin dam section criticized 217
Bartow, E. Activated sludge.....110, *972
Base-ball grandstand roof, Salt Lake Cy.....*707
Battle-cruiser bids.....1143, (n) 1154
Battleship. See also "War."
Battleship "Tennessee," Electric.....(n) 279
Bavonne, N. J.—Freight terminal *90, 962, Water-supply main break.....(n) 141
Beal, F. L. Determining tangent of compound curve *993
Beall, P. Expanded-metal bender.....*847
Beams, Stirrup-spacing diagrams for concrete. Bailey *694
Beams, Straightening Harrisburg bridge *385, *764
Beams supporting rectangular concrete slab, Distribution of load and moment to....(n) 464
Bear Lake reservoir and pumping station, Utah.....*67, 83, *98, *172, 178, *408
Bearings, Graphite-babbitt .....(n) 820
Beaver Val. Water Co. appraisal.....(n) 333
Beetle, Lead-drilling .....(n)1196
Begien, R. N., chief engineer, B. & O. 42, *138
Bell, C. F. Waterproofing drawings....808, 1037
Belle Isle bridge, New.....(n) 237
Belt, Canvas, for finishing concrete roads, *654, 709
Benchmarks, Permanent, Portland, Ore..... *55
Bender, Expanded-metal. Beall.....*847
Bending machine, Bar, Hinman.....(n)*144
Bennett, C. R. Tres Cruces dam repair....*1026
Benson Mines automatic skip handles hot ore. Schiefer *590
Bethlehem Steel Bridge Co. (n) 190, Pres. Blakeley *234
Bethlehem Steel Co.—City at Sparrows Pt. (n) 381, To spend $60,000,000 on extensions .....(n) 912
Bethlehem Steel Corp. affairs.....1237
Bevier, G., Jr. Leveling error.....*1037
Bichloride of mercury, effect on pipe and concrete .....(n) 616
Bilderbeck, G. L. Que. rocker stresses..... 760
Bilger, H. E. Alignment and drainage of rural highways.....*874, 901
Bill to suppress publications of national circulation 1187
Binghamton, N. Y.—Builds interceptor with four river crossings. LaRoche.....*1227
Birmingham, Ala.—Water-wks. purchase (n) 478
Bismarck, N. D.—Pavement contracts....(n) 770
Bitumen spreader, Finley.....(n)*820
Bitumens, Richardson's colloidal.....(n)1012
Bituminous. See "Pavements," "Streets," "Roads."
Bituminous-materials tests for sheet asphalt; A. S. M. I. specifications. Smith 205, 416, Forrest 209
Black, W. M. Using engineers in present military emergency '36, Opportunities for civilians to become engineer officers..... 615
Blagen, N. J. Mill-refuse burner.....*588
Blair, W. P. Monolithic brick pavements..1239
Blakeley, Pres. G. H.....*234

BLASTING
—Clay, Blasting in. Longstreet.....(n) 224
—Misfire, Handling; spoon for removing tamping. Du Pont Co *78
—Pole holes, Blasting.....(n) 412
—Quarry blasting, Well-hole. Russell..(n)1042
—Rock excavation, Subaqueous.....*171
—Well, Dynamiting, to increase flow.....1137

Bleeding wood blocks really bleeding joints. Dutton *737
Bleich, S. D. Inverted sewer siphons under N. Y. subway.....*442
Blitzen drainage canal. Hodges.....*1052
Blood, H. Strange highway bridge *317, Stack fall *618
Blower, Wing turbine, with novel lubrication, (n)*580
Blowouts in shield tunneling, Device to prevent. Leffingwell *728
Board of health control of sewage works, State 859
Boardman, C. S. Cylinder-pier foundations laid in sheetpile wells.....*289
Boat. See also "Ponton," "Dredge"
Boat, Diesel-engine excursion.....(n) 285
Boat, Drill, on canal work in Everglades. Phelps *704
Boats—Aluminum Co.'s Miss. barges.....(n) 817
Boats, Concrete, Panama 927, Others elsewhere .....(n) 625
Boats, Contractors' stern-wheel gasoline (n) 128
Boats, Electric-car ferry.....(ns) 475, 616
Boats for lake and ocean practicable? Coutlee 713, Evans.....*604
Boats for Que. bridge suspended span *420, *522
Boats—Motor scows as freighters, Mo. drainage work *742
Bock, C. A. Applications for employment, 258, 275
Bock's, F. L., water-meter slide rule.....*800
Bogue, V. G., Death of.....*768
Boiler code, A. S. M. E. Hess, Q. E. D. 278, Adoption in La. (n) 735, Natl. conference, Wash.; plans in Phila.....(n) 914
Boiler covering, "J. M. Aertite".....(n) 335
Boiler tubes, Dangerous ferrite growth in low-carbon, Detroit Edison plant. White, Wood 88
Boiler-water purifier, "Economo".....(n)1012
Boilers, Insulating concrete floor under.....*508
Bolt, Bronze, breakage, Panama 998, 1147, Corrosion 1005
Bolt sockets, Tenax expansion.....(n)*1012
Bolt, U. S. Exp. Bolt Co.'s "Arrow" "automatic" toggle .....(n)*532
Bolted and other timber-joint tests. Dewell, *111, *162, *796
Books and pamphlets, Monthly guide to engineering 322
Borrow, Long fill built from, Vandalia R.R..*800

BOSTON, MASS.
—Coffer-dam falls, Dry-dock.....237, (n) 429
—Elevated-railway finance .....(n) 860
—Engineers' reinstatement 35, 45, (ns) 94, 333
—Fire-service pumping station.....(n) 626
—Pavements recommended by comm..... 307
—Paving squabbles .....(n) 237
—South Station, Rapid transit from.....(n)1010
—Surface car through draw (n) 913, Safeguarding ..... 952, (n)1011
—Tunnel, Edison, blows out.....44, 285
—Tunnel, Drainage, surveying by sighting where transit failed. Plimpton.....*1141
—Typhoid rate reduced.....(n) 674
—Venturi meter, Air chamber protects, from pulsations. Doane *1184
—Water tank, Artistic, Bellevue.....*434

Boulevard, Twin Peaks, S. F.....*504
Bowen, E. R. Water meters, Redondo..... 910
Bowie, W. Precise-leveling method *74, (n)1041
Box, Collapsible freight, Pneu. Steel Corp.'s, (n) *48
Boynton, P. Clarksburg filtration..... 927
Brackett, Dexter, medal.....*478
Brakes for hydraulic turbines. Horton..... 181
Braking with elec. motors, Successful train—Linebaugh's review of progress..... 902
Brannon concrete patent.....661, 669
Brass-tube cracking and its cure, White; saw-toothed stress-strain curves of bronze wire, De Forest; strong aluminum bronze, Corse and Comstock—A. S. T. M. papers..... 87
Braun, H. H. Draft-tube forms.....*76
Brazil—Cable inclines, Sao Paulo Ry. Molitor.*976
Brick. See also "Pavements," etc.
Brick and tile sewers cracked under same loading, St. Louis *557, Comparison. Moreell *1024
Brick building tile, "Fiskiock" tapestry (n)*1248
Brick cubes, Resurfacing macadam roads with small 827
Brick for sewers, Los Angeles Co.'s "Frost" radial interlocking .....(n)*1248
Brick Mfrs.' Asso., Natl. Paving—Inspects pavements at Terre Haute, Ind., and Paris, Ill .....721, (n) 431
Brick pavements, Monolithic. Blair.....1239
Brick paving, Monolithic, for wide streets, Marshall, Ill. Paige *978, Cost records. Paige *1218
Brick, Testing fire. Nesbit, Bell..... 135
Brick, Tests of paving, N. Y..... 455
Brick, Use of vertical-fiber.....(n) 717

BRIDGES
See also "Viaduct," "Floods."
—Abutment depth, Cost of piles vs. increased, for highway bridges, Minn..... 270
—Allegheny bridge raising, War Dept. hearing on 427
—Am. Ry. Bridge & Bldg. Asso.—Meets at New Orleans 816, Experience of 41 rys. on small concrete jobs 849, Piledriving rules of 10 rys. (n) 900, Pile-jetting practice .....(n) 950
—Arch-crown thickness formula. Schwada..*880
—Atchison, T. & S. F.'s K-truss bridge across Ark. River, Pueblo, Colo.....*104
—Bascule bridge, A defective..... 743
—Belle Isle bridge, New.....(n) 237

Page

BRIDGES—Continued
—Bethlehem Steel Bridge Co. (n) 190, Pres. Blakeley *234
—Bridge engineering discussed by masters of the art—Waddell's book reviewed by Lindenthal 1174, 1188
—Canal, Erie, bascule bridge, Syracuse, N. Y. —Shallow railway floor; toe-lock mechanism, etc. Hayden.....*545
—Cashmere, Primitive timber-crib cantilever bridge in *965
—Catawba Riv., etc.—Contractor discusses bridges damaged by floods.....1233
—Catawba Riv. flood wrecks *184, Bridge span turned upside down. Lea (ns) *560, 756
—Cernavoda, Roumania, cantilever bridge..*861
—Chi. alley bridge, Strengthening..... 659
—Chi.—Bascule replaces old swing bridge, Fullerton Ave., C. & N. W. Ry.....*284
—Chi. bascule bridges, Wood flooring.....*220
—Chi. Riv. bridges, Improving appearance of—Madison and Jackson Sts. bascule..*282
—Chi., B. & Q.—Kan. Cy. bridge—Temporary bascule for construction. Da Camara *31, Bridge over Ohio at Metropolis, Ill. *151, (n) 1154, Tests of large struts of Metropolis bridge by Bureau of Standards reveal new facts *49, 81, Erecting and swinging 720-ft. span of Metropolis bridge *1198
—Cleveland bridge inspection and repair; state of Superior St. viaduct.....(n)1058
—Cleveland bridge wrecked by runaway car derailed at curve *718, Should street-car bridges be designed for derailment?..... 711
—Cleveland—Brooklyn-Brighton viaduct pavement (n) 127, Detroit-Superior viaduct progress *234
—Coffer-dam, Canvas, for canal-bridge pier, Coinjack, N. C.....*848
—Columbus, O., 10-span concrete-arch bridge near—Agler bridge over Alum creek. Knollman *1109
—Concrete bridge, Calcasieu Riv., Lake Charles, La. *865, Tar-carpeted floor....*904
—Concrete bridge, D., L. & W., Millburn, N. J.—Arch centers suspended from old plate girders *846
—Concrete bridge with falsework washed out completed from suspended forms, Little Colo. Riv., Ariz. Goodman.....*786
—Concrete bridges, Minn. highways—High steel prices increase use 222, Gravel floors must be carefully spread 330, Why use them? C. E. V. 468, Longshore 616, Nagel 712, Frankland *904, Test of new type *620
—Concrete footing offsets, Bond and shear in reinforced, Ill. Highway Dept. rule. Older, *18, (errata n) 325
—Concrete-slab bridge, Jacking into place, Monroe Co., N. Y.....*900
—Corpus Christi viaduct damaged by storm, *815, (n) 430
—Corrosion of bridge members near footwalk, by dogs, Milford, O.....*704
—Costa Rica Ry. bridge raising by levers when jacks failed. Penney.....*1088
—County-bridge curiosities — Damaged by autos.; light culvert; farmer's bridge of rails *754
—Culverts, Iron, for arch construction, Ariz. roads *330
—Dixon, Ill.—Old iron bridge damaged by electric car *357
—Drawbridge, Boston surface car through (n) 913, Greater safeguards needed for drawbridge openings 952, Investigation in Boston .....(n)1011
—Extensograph shows that old highway bridge, Stratford, Conn., leans to side—Welcker's report *1102
—Floating bridge, Lynn, Mass.; may be replaced .....(n)1057
—Ft. Wayne—Wabash grade-crossing elimination *241, Heavy concrete slabs make good railway bridges..... 277
—Harrisburg concrete-arch bridge of Cumberland Val R.R. over Susquehanna—Straightening 70-ft. I-beams of second half, bent by flood *385, Building it....*764
—Harrisburg bridge, P. & R. Ry.—Capping old piers under traffic.....*703
—Highway bridge of strange design, Rural timber, Cascadia, Ore. Blood.....*317
—Highway bridges, Motor-truck loads for. Childs *898
—Hudson Riv. Conn. R.R. bridge for Castleton, near Albany.....(n) 577
—Ill. highways—Bridge steel must be inspected before shop coat is applied...(n)1091
—Independence, Ore., concrete-bridge failure from careless work.....*672
—Indianapolis & Frankfort R.R. bridges...*1132
—Interstate Bridge, Columbia Riv., Portland, Ore.—Roller shapes paving along track..*550
—Kankakee Riv. bridge portals and lower laterals crippled by wind. Older.....*638
—Kan. bridge contracts, Fair competition required in—Decision 201
—Kan. Cy. (Kan) Terminal Ry. gets 200-yr. franchise—Viaducts to be built..... 814
—Kan. Cy., Mo.—New municipal bridges.... 576
—Kan. Cy., Mo.—Temporary trestle to complete bridge 529
—Kaw Riv. bridge plans, Osage Ave., Kan. Cy., Kan. .....(n) 429
—Keokuk bridge, Condition of iron in old; dismantling it *400

Page

BRIDGES—Continued
—La. highway bridges. Huckaby..... 545
—Luten concrete-bridge patent decision 577, 661
—Memphis—Harahan bridge over Miss.—Grade-crossing elimination at terminals. Weatherford *160, Opened to traffic..(n) 189
—Mich. highway-bridge failure caused by overturning stringers. Thomas.....*455
—Mich. highway bridges, Erecting, under traffic. Dewart *798, Standard pony-truss bridges. Dewart *990
—Mich. township-bridge concrete abutment wrecked by backfill. Thomas.....(n)*804
—Minneapolis concrete-arch bridge progress.*1201
—Mississippi, Another cantilever bridge for—At Burlington, Ia..... 429
—Missouri Riv. bridge, St. Charles, racked by creosoted-timber floor fire.....*670
—Montreal aqueduct combined bridge and headgates 427
—New Orleans bridge, To vote on (ns) 477, 626
—N. Y. Cy.—Queensboro bridge. Waddell, Lindenthal 1177
—N. Y. Cy. railway-bridge inspection....(n) 259
—N. Y. Cy.—10-story building on Blackwell's Isl. as Queensboro Bridge approach ..... (n) 27
—Penn. R.R. stone-arch bridge repair, Little Juniata—Old battle between stone masonry and concrete.....131, *368

Page

—P. & R. bridge over Susquehanna, Milton, Penn.—Pulling coffer-dam piles *509, Cinders make steel sheeting tight in swift current *558, Coffer-dam frame or templet (n) *610, Capping old Harrisburg bridge piers under traffic; falsework used.*703
—Pittsburgh, Herron Ave.—New roller shoe prevents tipping *647, Complex grade changes *1034
—Pittsburgh Point bridge ornamental portals *1242, Practical bridge decoration..1238
—Ponton bridges, U. S. Army. Barbour....*156
—Popolopen steel arch, Hudson Highlands..*337
—Potomac bridge plans, New.....(n) 332
—Quebec bridge—South cantilever arm completed. Meyers *298, 321, Suspended-span hoisting details; floating, jacking, etc. Meyers *420, Suspended-span erection. Meyers *522, Pictures *349, Credit deserved. Duggan 468, Full-load secondaries were eliminated. Mayer 517, Suspended span collapses 513, Barker *524, What caused disaster? 528, What happened at Que.? 561, Sympathy of engineering profession 563, Full evidence (with insert sheet) *572, Company will rebuild 575, Regrets. Cooper, Deans, Turner 622, Computing stresses in rocker casting *650, 661, Bilderbeck, Witmer, Keast 760, Baird, Anon., Foulds *857, Turning moments on suspended-span supports. Foulds *1191, Engineering problem without a precedent—Raising span 709, Inquiry. S. R. B.....(n) 664
—Reconstruction of notable large bridges—Penn. Lines at Louisville, Cin. Southern at Cincinnati, Miss. Riv. at Keokuk, Union Pac. at Omaha..... 92
—Rock Isl. concrete-bridge work, Chi.—Locomotive crane *1172
—Rock I. Lines—Slab-deck concrete bridge over highway *1002
—St. Louis municipal bridge, Completing *1129, New type of concrete floor.....*1230
—Salamanca, N. Y., plate-girder cantilever bridge. Hayden *266, Demolishing old steel one and handling girders. Steere *316, Constructing pile foundation in hard gravel. Steere.....*338
—San Francisco Bay bridge.....*426, (n) 141
—Shovel strikes bridge, Cleveland.....(n)*274
—Skew, Field determination of bridge. Whited ..... (n) 996
—Southern Ry. bridge piers, Tugaloo Riv., built quickly by effective plant.....*899
—Standard plans for I-beam and concrete bridges, Longshore's, Adams Co., Ind....*471
—Stone-arch highway bridge, Cheap. Fletcher *368
—Thacher concrete-bridge patent decisions, 44, 621, 661
—Union Pacific's renewal of Mo. Riv. bridge, Council Bluffs-Omaha .....(ns) 92, 101
—Utah—Howe truss highway bridge with composite chord *559
—Warren, Penn., Allegheny Riv. bridge—Result of failure to submit falsework drawings ..... (n) 430
—West Shore R.R.—6,000-ton rock slab pinned to save bridge, Highland Falls, N. Y. Warnecke.....*358, 367
—West Va. flood damage.....*428
—Worcester — Lake Quinsigamond bridge piledriving *462

Bright, J. S. Asphalt-joint filling.....*851
Briquet-fuel production .....(n) 485
Briquetting press, Metal-waste hyd.....(n)*628
British Asso. for Advancement of Science...*758
British engineers in Canada..... 613
British power stations, Linking up.. ...(n)1166
Brockway, P. L. Pavement joints..... 905
Brodd, L. S. Chi. street traffic.....761, 905
Bronze corrosion, Panama locks.....1005
Bronze wire, Saw-toothed stress-strain curves of, De Forest; strong aluminum bronze, Corse and Comstock; cracking of brass tubes, White—A. S. T. M. papers..... 87

Page

Bronzes, More evidence of unreliability of the stronger, at Panama Canal—Bolt breakage 998, Detecting initial stress in bronze. Miller 1147
Brookline, Mass.—Iron removal.....*448
Brooks, B. Effect of sewer gas on concrete sewer *486, 511
Brooklyn-Brighton. See "Viaduct."
Brooklyn, N. Y. (See also "New York City") —Activated sludge. Hammond 107, Tunnel grouting in Catskill Aqueduct. Myers *196, Granite-block pavement, Bedford Ave. *491, Edison station—Underpinning with hollow piles driven with point *982, Piledriver *463, Automatic sewage-pumping station. Gersoni *810
Broom, Power, for concrete pavement.....*1121
Brosius, A. M. Activated sludge, Hermosa beach *890
Brown, J. F. K. Steadying suction pipe...*1185
Brown print white, To mark. Godfrey 1141, (n)1001
Brush, W. W. Correcting Croton water-shed area 576, 664
Bubbly Creek will bubble no more.....*725
Bucket, Clamshell, closed by steam engine, Portland, Ore. *316
Buckling of concrete roads. S. H. E..... 324
Buenos Aires slaughter-house sewage test plant. Coulter 837
Buff, L. P. Vocational guidance..... 565

BUFFALO, N. Y.
—Buffalo Genl. Elec. power-house foundations. Boardman *289, Pulling sheet-piles *510
—Gas case, Unit prices for street mains in. Humphreys 516
—L. V. passenger terminal.....*390, *436
—Sewage-disposal investigation .....(n)1202

Bug, Lead-drilling .....(n)1196

BUILDINGS
See "Concrete," "Floor," "Roof," "Accidents," etc.
—Am. Tool Wks. Co.'s plant *991, (erratum n) 1193
—Blackwell's Isl. bridge approach.....(n) 27
—Car-repair shed with cement-tile roof, Ill. Cent., Nonconnah, Tenn.....*474
—Cleveland Code—Plumbing. Drayer..... 328
—Colt's arms factory erection, Quick, by Aberthaw Co. .....(n) 852
—Concrete building balanced on middle line of columns, Canal Zone. Hardman....*1166
—Concrete ice factory, Tearing down old, Gt. Atl. & Pac. Tea Co.'s, Jersey Cy. Hoadley *729
—Continental & Comm. Bank, Chi.—Altering columns in 21-story skyscraper.....*1170
—Factory buildings, Cost of timber and concrete. Davidson, Natl. Lumber Mfrs.' Asso., Condron 884, Concrete free from depreciation. McCullough 954, Ed. 1043, Building in Wilmington, Del. Muhlhausen.1193
—Floor, Concrete, fails after early removal of forms, N. Y.....*1050, (n)1106
—Huntington, W. V., high school—Taking care of eccentric loads from balcony brackets *763
—Ill. Univ. Ceramic Bldg.....(n)*1105
—New Bancroft Hotel, Saginaw, peaked concrete roof. Jensen.....*372
—N. Y. Cy.—New building board 137, Zoning regulations 225, 405
—Oregon cement plant. Findlay.....*1194
—Pan. Pac. Expo. building takes 25-mile cruise *381
—Phila. municipal auditorium.....*188
—Portable steel buildings on construction work, Trussed Concrete Steel Co.'s.....*585
—"Public buildings" raid on the Treasury..1238
—Richman building, Cleveland—Motor trucks dump at second-floor level.....(n)*1041
—Roxbury Industrial School shop—Flat-slab floor failure due to poor brick wall columns. Thompson *262, Wolf, Von Mueller 614
—School plans, N. E. A. standard.....(n) 817
—Security cement plant. Hewitt.....*1222
—Security Mutual Life Ins., Lincoln, Neb.—Placing steel frame in old wall-bearing building *778
—Shores, Roos' adjustable.....(n)*1186
—So. Pac. office bldg., S. F.....*509
—Stratford Theater, Phila.—Pouring concrete girder *506
—U. S. Bureau of Public Bldgs. (n) 139, Abandoned with Buildings Appropriations bill ..... (n) 190
—U. S. Public Buildings Comm. for D. C.(n) 141
—Vibration, Opinions on, collected by Aberthaw Const. Co..... 624
—Walker Mfg. Bldg., Racine—Gypsum roof slabs, 10-ft. span..... .....*1173
—Water-wks. structures, Artistic touches for simple .....*433, (n) 616

Burford, R. A., Jr. Montreal pump..... 133
Burlington, Ia., bridge..... 429
Bush freight terminal, Bayonne.....*90, 962
Business prosperity and steel production....1237
Butcher, W. L. Water flow increases with rising temperature *326, 611, Mass. diagram *376
Butte, Mont.—Steel and wood water mains, (correction n) 134, Laying sewer pipe..(n)*384
Buttresses, Weak retaining wall saved by anchored, Denver *30

Page

Byers' "Auto-Crane" *507
Byrd, J. H. Floor test..... *11

C

Cable armored with composite lath.....(n)*628
Cable inclines, Sao Paulo Ry. Molitor.....*976
Cable railways, Edinburgh, etc.....(n)1074
Cable system handles dump wagons on heavy grades, San Francisco. Owen.....*272
Cables, Tunnels for elec., Chi..... 633
Cableway, Aërial, substitute for bridge, Philippines *12
Cableway, Lidgerwood, for Miss. levee work. Wight 1115
Cableways, Aërial, on Los Angeles Aqueduct —Makers ..... (n) 134
Caisson, Large dry, sunk as building foundation, Bear Lake pumping station, Utah *98, Concrete deposited by tremie *172, 178, Double-derrick platform.....*408
Caisson, Manholes built in quicksand with open 30
Caisson sinking, Albany pump house.....*738
Caissons, Cylinder-pier, Buffalo G. E. power house *289
Calcasieu Riv. bridge, La.....*865, *904
Calculating 4-sided areas, Short method of. Averill *1186

CALIFORNIA
—Dams, Board urges state control of..... 259
—Flood-wrecked well and pumping system, Salvaging, San Diego. Francis.....*980
—Flooded pumping plant, Salvaging, San Luis Rey River. Silent.....*125
—Plank roadway, Portable.....(n) 708
—R.R. Comm.—Safe grade crossings.....*1185
—Ry. construction, State cannot compel..(n) 985
—Road fund, What Calif. has done with $18,000,000 101
—Road-work bonds, $15,000,000.....(n)1009

Calumet Harbor, Chi., development.....(n) 382
Camden, N. J.—Warehouses on terminal piers, *1150
Cameron septic-tank patent 663, (ns) 141, 866
Camp Whitman water-supply, etc.....*498, 513
Canada—Wheat routes to seaboard *604, 713, British engineers in Can. 613, Railway investigating comm. (n) 333, Water-power resources ..... (n)1003
Canadian boundary—Buff. sewage disposal.(n)1202
Canadian Geodetic Survey—Photogrammetry for taking topography of watershed. Nelles *878
Canadian Soc. Civil Engineers—Objects to appointment of aliens 711, Sullivan 855, On Montreal municipal water-power plant. 1043, *1049

CANALS
See also "Irrigation."
—Atlantic inland waterway.....(n) 579
—Chi. drainage-canals flow limitation (n) 93, Joliet dam power bids.....(n) 237
—Drainage canal, Velocity coefficients for dredged, Blitzen, Ore. Hodges.....*1052
—Drainage ditches, Building 600 miles of, Little Riv. dist., Mo.....*740, *76, *342
—Dredges, Artesian well to float.....(n) 80
—Everglades, Drill barge on canal work in. Phelps *704
—Flume intakes and outlets, Hydraulic principles of, Norton *541, Kennison 1096, Hinds *1097
—Georgian Bay canal, Proposed; traffic routes, Lakes to seaboard. Evans *604, 713
—Goose Lake Val. irrigation.....*503, 809
—Imperial Val. canal-work costs.....(n) 333
—Irrigation canal, Cerro Prieta..... 233
—N. Y. Barge Canal—Power plants and factories moved at Seneca Falls; Canal power plant *145, Canal in partial operation 373, Progress; terminal problem (n) 1057, Shallow railway floor on Erie Canal bascule bridge, Syracuse. Hayden.*545
—Old canals, How to use, Cincinnati, Syracuse, Rochester 903
—Panama:
Bronze-bolt breakage drops gate counterweight—Goethals' report.....998, 1147
Coaling plant .....(n)1011
Concrete barges .....927, (n) 625
Concrete building balanced on middle line of columns. Hardman..... .....*1166
Cristobal pier .....(n) 914
Dry-dock, Balboa, Roughening concrete floor for resurfacing. Hirschberg.....*755
Dry-dock rules .....(n) 842
Goethals' annual report—Finance; dry-dock; concrete blocks for east breakwater; buildings on Isthmus; electric power station; water-supply 1004
Locks, Corrosion of submerged metal at—Annual report 1005
Operation statistics .....(n) 914
Slide .....(n) 625
Slide critics, Goethals on—Annual report.. 986
Ship canals to aid Navy in national defense; Capt. Niblack's views.....1188
—Terminal charges, U. S. waterways—Barge Canal study .....(n)1057
—Tunnel, Marseilles canal.....*1013
—Turners Falls, Mass., riprap canal-lining slide and repair.....*1031, 1046
—Union Water Power Co., Lewiston, Me—Saving canal walls built on old plank foundations. Sawyer *556

Canvas belt for finishing concrete roads *654, 709

Page

Cape Fear River, Steel sheetpile coffer-dam for lock on..... 549
Capitol terraces made waterproof.....*629
Car. See also "Railways," "Electric railways," etc.
Car, Concreting, Sandy Ridge tunnel.....*936
Car-demurrage rate increase.....(n)1202
Car, Differential electric dump.....(n)*192
Car ferry, Elec., Oakland, Calif. (n) 475, Evansville, Ind. .....(n) 616
Car, Improved dump, C., B. & Q.....*1184
Car, Level tripod on.....*74, 1159, (n)1041
Car, Rail-and-road elec., Bradford, Eng..(n) 397
Car-repair shed, Ill. Cent., Nonconnah, Tenn. *474
Car shortage, Prompt unloading of freight to prevent 511
Car, Steel, Bureau of Fisheries'.....(n) 175
Car-wheel flanges and frog clearances..... 34
Carbon-dioxide indicator, Bacharach pocket, (n)*916
Carpenter, G. Y. Central concrete-mixing plant, Balto. Carpenter.....*268
Cars, Dump, Johnson rerailer for.....(n)*432
Cars, Dump, Types of, used on construction work *581, *640, Selection and use..... 611
Cars, Flat, with false floors for dumping, Crossett Lumber Co.....(n) 412
Cars, Muck, Transfer plate for.....1038
Cars, Seatless rapid-transit, London.....1128
Cart, Gravel, made of scrap, Christman's, Lothrop ..... (n) *80
Cary, Ill.—Concrete water tower.....*895
Cascade Mtn. tunnel. Chittenden *928, 953, Walker *1190
Cashmere, Timber bridge in.....*965
Catchbasin and inlet, Pueblo *77, Steel-step cost reduction .....(n) 224
Catchbasin and inlet, San Antonio.....(n)*1042
Catchbasin inlet, Large Council Bluffs....(n) *32
Catchbasins and culverts on roads, Vermilion Co., Ill. *209
Catenary, Rectification of. Honey *256, Strachan 1046
Caterpillar excavators, Tracks for....*76, *344
Catskill Aqueduct. See "Aqueducts."
Causeway, Effect of hurricane on Corpus Christi .....*815, (n) 430
Causeway progress, Galveston (n) 333, Concrete arches favored (n) 1153 (erratum n) 1193
Cave, Stalactite, moved from Ariz. to N. Y., (n) 495
Cave-in. See "Earthslides." "Accidents."
Cement. See also "Concrete," "Grout."
Cement, American, in Ecuador.....(n) 242
Cement Asso. laboratory adjunct, Lewis Inst., (n) 673
Cement from oyster shells; Texas Portland Cement Co. mill. Struckmann.....*230
Cement gun, Building reservoirs with.....*894
Cement gun, Waterproofing dam with.....*1159
Cement-industry operations .....(n) 286
Cement kilns, Shuting down, on Sunday. Brown .....(n)197
Cement-lime-milk paint .....(n) 128
Cement-mill byproduct, Potash as valuable—Cottrell process at Security Cement & Lime plant. Hewitt *1222
Cement mill, Oregon Portland Cement Co.'s electric-driven. Findlay *1194
Cement production in 1915.....(n) 46
Cement, Slag, permitted, New Orleans.....(n) 770
Cement specification, Once more one accepted 35, A. S. T. M. report 39, The specifications 43
Cement-tile roofing, Crane plant.....*154
Census. See "U. S."
Centrifuging, Drying sludge by.....*1126
Ceramic Bldg., Ill. Univ.....(n)*1105
Cernavoda, Roumania bridge.....*861
Cerro Prieta irrigation canal..... 233
Chain cables, Large, power-forged at Boston Navy Yard. Coburn.....*1113
Champaign, Ill. Activated sludge.....*973
Chapman, C. M. Concrete-aggregate specification 136
Charleston Lt. & Water dam fails.....*232
Charlotte, N. C. Street work under tent 175, Garden-hose finish for concrete pavements *803, Steel paving.....*946
Chart. See also "Diagram."
Charts for eccentric loading on rectangular areas. Cotten A*1090
Charts, Traffic, St. Louis.....*832
Chattanooga, Tenn.—Water-works valuation, (n) 141
Chemists and engineers talk on sanitary problems 673
Cheyenne, Wyo., pavements.....*482

CHICAGO, ILL.
See also "Railways."
—Bridge, Bascule, replaces old swing bridge, Fullerton Ave., C. & N. W. Ry.....*284
—Bridge, Strengthening an alley..... 659
—Bridges, Improving appearance of.....*282
—Bridges, Wood flooring bascule.....*220
—Calumet Harbor development.....(n) 382
—Commonwealth Edison plants *52, *1040, *1045
—Drainage canals flow limitation (n) 93, Joliet dam power bids.....(n) 237
—Engineers ask higher salaries.....1201
—Ill. Cent. terminal to cost $20,000,000 624, 1200
—Park grading by day labor.....*966
—Pavements, Co-operation saves..... 130
—Paving under administration fire—Baker's report 1104
—P. R.R. freight station—Pile tests 801, Tower derricks *802
—Pipe, Inspecting cast-iron water.....(n) 700

Page

CHICAGO, ILL.—Continued
—Rapid-transit system plans; map..1104, *1148
—Rock Isl. track elevation—Loco. crane for concrete-bridge work *1172
—Sewage dilution hit.....1151
—Sewage treatment—Activated sludge. Pearse 109, Armour plant. Noble..... 110
—Sewage treatment and dilution.....1056
—Sewage treatment, Cook Co. institutions...*296
—Sewer, Calumet intercepting, Specifying progress ..... (n) 364
—Sewer, Effect of sewer gas on concrete. Brooks *486, 511
—Sewerage—Bubbly Creek will bubble no more *725
—Stockyard sewers, New and old..... 487
—Stockyards, etc., refuse disposal; sewerage, (ns) 427, 1202
—Street grading, Koehring excavator for....*495
—Street traffic, Heaviest. Brodd.....761, 905
—Tunnel under river, Lowering st.-ry.....*968
—Tunnels for elec. cables..... 633
—Water-supply sewage pollution.....(n) 430

Childs, O. W. Motor-truck loads for highway bridges *898
Chile copper-ore handling..... 169
Chimney. See also "Stack."
Chimney settlement kills men, Corning, N. Y., glass works .....(n) 190
China, Dredge for. Coleman *170, Development of Govt. railways in. Wang 540, Am. company to build railways in 673, G. A. Kyle to be engineer.....*814
Chipman, R. M. Chemical weeding.....1047
Chippewa Creek, To develop.....(n)1056
Chittenden, H. M. Miami flood prevention *906, 1055, 1093, 1190, Cascade Mtn. tunnel, *928, 953, *1190
Chlorate of potash explosion.....(n) 320
Chlorinating water-supply of Greater N. Y. Coffin *438
Chlorine, Liquid, U. S. output.....(n) 437
Chlorine, Montreal Water Co. makes its.... 477
Chords. See "Curves."
Christmas present, "Engineering News" as..1143
Church, Gas explosion wrecks.....(n)*660
Chute, Steel-lined material, Shore tunnel, Milwaukee ..... (n)*708
Chutes on Italian freighter.....*210
Chuting concrete down steep slopes, So. Ry.*1182
Cincinnati, O.—Rapid-transit surveys (n) 674, Park Ave. viaduct (n) 674, Hopple St. viaduct open (n) 864, New railway terminals (n) 866, City planning (n) 1010, Water-main extension rules.....(n)1092
Cinders make steel sheeting tight in swift current *558
Circles—3-point problem solution.....(n)*610
Circuit-breaker, G. E. 20,000-amp. d.c...(n)*772
City. See also "Municipal."
City and county debts, Curbing, N. J..... 613
City built upon a hole.....276, *280, *681
City contracts, No bidders on.....1044
City debts—Census bulletin.....(n) 46
City engineer's office, Registering kicks at... 437
City-manager plan, Cleveland.....(n)1106
City manager wanted, Portsmouth, Va.....(n) 625
City manager's job, Selling good government..1045
City Managers' Asso. meeting, Springfield, Mass. 1053, 1054

CITY PLANNING
—Aëroplane to visualize layout.....(n) 461
—Cincinnati, O.....(n)1010
—City Planning Conference, Cleveland—Paper—Planning problems in cities of the smaller class. Nolen..... 102
—Cleveland's new city hall and civic center..*131
—Dublin rebuilding plans.....(n) 429
—Duluth, Minn., replanning. Patten.....*615
—Excess condemnation, Los Angeles. Mohler *20
—Ind. Real Est. Asso. campaign.....(n) 770
—Mass. city boards of survey..... 189
—N. Y. Cy. zoning progress 225, Progress. Ford 405
—Penn. State Asso. of Comms.....(n) 113
—Sacramento, Calif., replanning and re-districting *144
—St. Louis, Mo., replanning 188, May spend $8,000,000 1151
—Sparrows Pt., Md., New city.....(n) 381

Cities, Lessons from Ohio—Tax-limit and sinking fund laws..... 759
Civil-service exam., Junior Engineer.....1074
Civil-service exams. for Ill. Junior Highway Engineer without leaving home.....(n)1200
Civil-service examinations. Merit.....1031
Clapp's grip-type rail joint.....*735
Clarksburg, W. Va.—Changing from alum to iron at filters. Boynton..... 927
Claussen, T. H. Truck springs save pavements 901
Clay, Blasting in. Longstreet.....(n) 224
Clearances, Swiss railway.....(n)1007
Cleary, A. J. Twin Peaks tunnel.....*636
Cleary-White Const. Co. methods.....654, *994
Cleburne, Tex.—Imhoff tanks and sprinkling filters. McDonnell.....*1028
Cleveland Dock & Eng. Co.'s patent..... 951
Cleveland Engineering Soc. to the rescue. Drayer 328, Addresses.....1102, (n)1107

CLEVELAND, O.
—Activated-sludge results, Cleveland, reviewed. Pratt, Gascoigne, *1061, *1124, (n) 110

Page

CLEVELAND, OHIO—Continued
—Bridge inspection and repair.....(n)1058
—Bridge wrecked by car.....711, *718
—Brooklyn-Brighton viaduct pavement...(n) 127
—City hall and civic center.....*139
—City Manager plan.....(n)1106
—Detroit-Sup. viaduct progress.....*234
—Elec. ry., Dump-car on.....(n)*192
—Garbage-tankage yield.....(n)1202
—Motor-truck load and speed limits.....(n) 719
—Municipal lighting-plant operating results, Ballard 603
—Paving-work bonds.....(ns)141, 1009
—Plumbing ordinance controversy..... 328
—Public-service directors, Engineers needed for 866
—Water-supply to be purified and softened—Filter plant *732, Arch collapse *186, (n)141, Will jacket clearwater basin with reinforced concrete (n)1009, Foundation settlement 1095, *1099, Quick repair bids 1150
—Water-intake tunnel—Knife for clay face *360, Transfer plate for muck-cars 1038, Divergence from line and grade (n)382, Explosion 187, 236, 380
—Water-main laying for track depression (n)*1042
—Water tunnel under Cuyahoga Riv.—Sinking shaft *374, Tunneling in firm clay with compressed air *1220

Cliffs kept from falling on tracks—By pinning *358, 367, By concrete toe-wall.....*359
Clinometer and range finder, Young's.....*1183
Clinton, Ia.—Railway impvts. *102, Hollow-tile sewers.....*634
Cloth, Two ways of testing. Lewis, Whalen..*135
CO_2 indicator, Bacharach pocket.....(n)*916
Coagulant, Intermittent excess, Springfield. Lochridge 617
Coal- and ore-handling method. Gilpin..... 169
Coal dredging, Penn. rivers.....(n)644
Coal dumped in Boston sewer.....(n)1057
Coal-mine cave-ins, Scranton.....276, *280, *681
Coal-mine explosion, Roden.....(n)913
Coal pits, Waterproof.....*635
Coal, Powdered, as fuel—Application to locomotives, etc.....177, (n) 27
Coal production, U. S.....(n) 169
Coal-traffic statistics, Seaport.....(n)1047
Coal wealth of U. S. and industrial supremacy—Brit. Asso. report—Internatl. Geol. Congress diagrams of world's comparative coal resources.....*758
Coaling plant, Panama Canal.....(n)1011

COAST EROSION AND PROTECTION
See also "Levee," "Revetment," "Rivers," "Flood."
—Concrete-revetment machine, Miss...*1070, 1094
—Holland, Draining North, after Jan. flood. Spaander *773
—Mattress, New type of. Everham.....*1022
—Miss., Five days on. Wight.....*1114
—Seawall, Longport, N. J.....(n) 382
—San Francisco shore protection nearing completion; Esplanade.....*543
—Texas coast storm-swept (n)429, Effect on Corpus Christi viaduct.....*815

Coburn, F. G. Chain cables.....*1113
Coffer-dam. See also "Caisson."
Coffer-dam, Emergency canvas, for canal-bridge pier. Coinjack, N. C.....*818
Coffer-dam piles pulled by inverted hammer at Buff. Genl. Elec. Co. condensing-water tunnels *510
Coffer-dam piles pulled by loco. crane on trestle, P. & R. Susquehanna Riv. bridge, Milton, Penn. *509; Cinders make steel sheeting tight in swift current *558, Coffer-dam frame or templet.....(n)*610
Coffer-dam fails, Earth-fill, South Boston dry dock .....237, (n) 429
Coffer-dam for concreting pier foundation, Salamanca bridge. Steere.....*338
Coffer-dam, North River piers, N. Y., completed inside of..... 45
Coffer-dam, Rochester, N. Y.....*824
Coffer-dam, Steel sheetpile, for lock on Cape Fear River..... 549
Coffer-dam work—Binghamton sewer.....*1227
Coffer-dams, Placing wood, without driving, at Ohio River dam 24. Shriver.....*1140
Coffer-dams, Timber and gravel, of Troy dam. Watt *492, Steel sheetpile coffer-dams. Watt *533, Pulling the sheetpiles *408, 613, Pile hammer.....*609
Coffin, T. D. L. Chlorinating N. Y. water...*438
Coke-oven byproducts production.....(n) 626
Coke plant near N. Y., Placing foundations for—Koppers plant for Seaboard Byproduct Coke Co., Jersey Cy.....*688
Coleman, F. C. Dredge for China.....*170
Collins, A. L. Pumping crude oil..... 22
Colombia—Girardot port impvts.....(n) 817
Colt's arms-factory erection.....(n) 852
Columbia Univ. United Engineering Societies.1197
Columbus, O.—River widening 1055, 1093, Agler 10-span concrete-arch bridge. Knollman *1109
Columbus Park, Chi.—Grading by day labor..*966
Column tests, Metropolis bridge, by Bureau of Standards *49, 81
Columns, Buckling, in jacking up Riverside Drive viaduct.....*869
Columns fail, Brick wall, Roxbury school. Thompson *262, Wolf, Von Mueller..... 614

Page
Columns in 21-story skyscraper, Altering stone-encased steel *1170
Combahee Corp. pumping plant.....*839
Commission plan. See also "City."
Commission plan and city manager.....1045
Commonwealth Edison Co.—Large turbine *52, Wrecking old machinery *1040, Growth, *1045
Compensation—Chi. engineers ask higher salaries 1201
Compensation, Engineers—Detroit report.....1189
Compensation, Workmen's, Penn., report..(n) 217
Competition. See also "Engineering Competitions."
Competition, Engineering, by Univ. Minn..(n)1151
Competition, Govt. and student. Barnett; Glennan, Pub. Health Service 36, Norcross 180
Competition, Govt. engineers, N. Z.....(n) 305
Compressor, Air. See "Air."

CONCRETE
See also "Cement," "Grout," "Pavements," "Roads," "Streets," "Retaining wall," and specific kinds of structures.
—Albany Engineers' concrete symposium.... 864
—Albany pump house and grit chamber, Building. Vernon.....*738
—Am. Concrete Inst. placed on sound basis.. 902
—Baltimore Concrete Placing Co.'s central mixing plant. Carpenter.....*268
—Barges, Concrete, stand test, Panama 927, Others elsewhere.....(n) 625
—Bear Lake pumping-station foundation, Utah *100, Concrete in caisson deposited by tremie, etc.....*172, 178, *408
—Beams, Stirrup-spacing diagrams for. Bailey *694
—Bichloride of mercury, effect.....(n)616
—Bridge abutment, Plain concrete, wrecked by backfill, Mich. Thomas.....(n)*801
—Bridge, Agler 10-span concrete-arch, near Columbus. Knollman.....*1109
—Bridge, Calcasieu Riv., Lake Charles, La., *865, *901
—Bridge completed from suspended forms, Little Colo. Riv., Ariz. Goodman.....*786
—Bridge, D. & W., Millburn, N. J., arch centers suspended from old plate girders.*846
—Bridge failure from careless work, Independence, Ore.....*672
—Bridge floor, New type, St Louis.....*1230
—Bridge-patent decision, Luten..... 577
—Bridge-patent decisions, Thacher.....44, 621
—Bridge repair, P. R.R. stone—Old battle between stone masonry and concrete 131, Fletcher *368
—Bridge, Slab-deck, over highway, Rock I. Lines; carrying station platform; waterproofing, etc.....*1002
—Bridge standard plans, Longshore's.....*471
—Bridge, Susquehanna concrete-arch, Harrisburg, of C. V. R.R.....*385, *764
—Bridges, Erecting highway, under traffic, Mich. Dewart.....*798
—Bridges, Minn. highways—High steel prices increase use 222, Test of new type *620, Gravel covers.....330, 468, 616, 712, *904
—Building balanced on middle line of columns, Canal Zone. Hardman.....*1166
—Catskill Aqueduct tunnel, Brooklyn end; grouting *196
—Central plant, Dry mixing of materials at—Prize offer 805, 997, Award.....1237
—Chuting concrete down steep slopes, So. Ry *1182
—Cleveland filter groined arch collapse *186, (n) 141, Will jacket clearwater basin with reinforced concrete.....(n)1009
—Cliff kept from falling on track by concrete toe-wall.....*359
—Coal pits, Waterproof; fireproof ashpits made with gold-ore slag aggregate.....*635
—Coke-plant foundation work, Koppers, for Seaboard Co.....*688
—Construction features used by Ferro Concrete Const. Co.—Am. Tool Wks. building—Flexible mats for forms, tower with split boom, tricycle and bicycle carrying extension of chute, etc *991, (erratum n)1193
—Counter, Concrete-elevator. Tailer.....(n)*852
—Culvert building for 150-ft. fill, Southern Ry., Ga.....*850
—Cylinder-pier foundations laid in sheetpile wells, Buffalo G. E. power house. Boardman *289
—Dam, New hollow, with subdivided water pressure, for Genoa, Italy, and Ruteberg's patent.....*788
—Dam, Thin arch, Australia. Nimmo.....*712
—Dams, Gem and Agnew Lake multiple-arch in Sierra Nevadas; waterproofing with cement gun, etc.....*1157
—Detroit street-railway work, Concreting train for *1138
—Dock patent upheld. Ferguson-Carey, of Cleveland Dock & Eng. Co..... 961
—Draft-tubes, Forms for heavy, Spanish irrigation project. Braun.....*76
—Drift catcher, Erie, Penn. Seelye.....*795
—Dump wagons superior to carts..... 79
—Elec. conduits—N. E. E. A. report.....(n) 669
—Esplanade, San Francisco.....*543
—Factory buildings of timber and concrete, Cost of. Davidson, Natl. Lumber Mfrs.' Asso., Condron 884, Concrete free from depreciation. McCullough 954, Ed. 1043, Building in Wilmington, Del. Muhlhausen.1193

Page
CONCRETE—Continued
—Floor cracked by settlement, Load test of. Byrd *11
—Floor failure, Flat-slab due to poor brick wall columns, Roxbury school shop. Thomson *262, Wolf, Von Mueller..... 614
—Floor falls after early removal of forms, N. Y. building.....*1050, (n)1106
—Floor, Insulating concrete, under boilers, by Ferro Concrete Const. Co.....*508
—Floor tested by stack fall, Portland, Ore. Blood *618
—Floors—Seattle flat-slab test. Turner 84, Many unbiassed tests. Lord 85, Godfrey 279
—Footing offsets, Bond and shear in reinforced—Ill. Bridge Bureau rule. Older, *18, (errata n) 325
—Footing walls, Concrete, built by Johnson & Co., Chi.....*362
—Foremen's courses, Wentworth Inst.....(n) 382
—Forms, Steel-jacketed, and traveler, for winter concreting of retaining wall, near Paw Paw station, Magnolia cutoff, B. & O.....*269
—Girder, Deep concrete, poured in three lifts, Stratford Theater, Phila. Muhlhausen..*506
—Ice factory, Tearing down old, Gt. Atl. & Pac. Tea Co.'s, Jersey Cy. Hoadley....*729
—Melber reinforced-concrete patent decision, Pittsburgh high school. Godfrey 668, the Brannon patent.....661, 669
—Mixer, Bucket conveyors feed concrete, Nashville school.....*1036
—Mixers, Lakewood water feed for.....(n)*381
—Mixers, Largest, Yadkin Devel.....*922
—Mixing plant for river-bank paving.....*1118
—Nomenclature—Meaning of "concrete"..... 81
—Ore dock, Ashland. King.....*242
—Panama—Concrete blocks for breakwater; buildings 1004
—Patent situation, Signs of clearing in..... 661
—Pier, Redondo Beach, Calif. Roberts.....*518
—Piles, Bottom-driven, on Govt. job—Federal Bldg., Wilmington. Howell.....*1207
—Pipe, Reinforced, used for culverts on various western railways.....*592
—Platform shelters, unit const., So. Pac., Los Angeles *73
—Pneumatic concreting and its development; rotary mixer. Graham.....*386
—Railways, Experience of forty-one, in small concrete jobs—Cost, tools, etc.—Am. Bridge & Bldg. report..... 849
—Refuse burner, Gray's Harbor lumber. Blagen *588
—Reinforced concrete, Looking at inside of—Stettler's Roentgen photos..... 563
—Reinforced-concrete reservoir wall tips, Madison *476
—Reinforcement bender, Expanded-metal. Beall *847
—Reservoir, Concrete-lined oil, El Segundo..*849
—Reservoir, Failure of concrete, built on old stone wall, Winfield, Kan.....*401
—Reservoir relining, Omaha; mixer and depositing machine.....*646
—Reservoirs without forms built with cement gun, Cary and Elmhurst, Ill.....*891
—Revetment machine for Miss. Markham, *1070, 1094
—Rochester dam and head house—Jensen's pneumatic concreting machine.....*824
—Roof, Peaked, New Bancroft Hotel, Saginaw. Jensen.....*372
—Roughening concrete floor, Balboa dry-dock, for resurfacing. Hirschberg.....*755
—Roughing tool, Gardner.....(ns) 288, *628
—Salt water causes cracking reinforced, Philippines. Harrison.....1047
—Sand, Albany engineers discuss..... 949
—Screed with plow handles, Pasadena..(n)*1236
—Sewer-gas effect on concrete, Chi. Brooks, *486, 511, *795
—Shores, Roos' adjustable building.....(n)*1186
—Slab, Distribution of load and moment to beams supporting rectangular.....(n) 464
—Slab-floor pat. decisions, Turner.....720, 769
—Specifications for hand-mixed concrete culverts, Two recent—Gt. Nor. Ry.; Mich. Cent. R.R.....171
—Stairway, Cantilever. Phila. house.....(n)*950
—Testing—A. S. T. M. papers—Wear tests, Abrams; Strength of clamp splices in reinforcement, Lasier; aggregate specification, Chapman; finding specific gravity of aggregates, Hubbard, Jackson..... 135
—Tests, Road material, N. Y..... 456
—Tunnel, Greensburg, Pneu. concreting *254, 276
—Tunnel, Lowering st.-ry., under Chi. Riv.; pneumatic concreting.....*972
—Tunnel, Mill Creek sewer, St. Louis—Materials chuted through drill holes to pneumatic mixer. Horner.....*705
—Tunnel, Milwaukee water-intake, concreting methods. Warren *794, Material chute, (n)*708
—Tunnel, Sandy Ridge, of Car., Clinchfield & O. Ry.—Lining with pneu. mixer under traffic; concreting car, steel forms, etc. *936, *899
—Twin Peaks tunnel pneumatic concreting..*637
—Viaduct, Raising settled bent of, Denver..*221
—Viaduct, Side-hill, Cuyahoga Co.....*352
—Viaduct vs. fill for street elevation, Astoria. McClean 325
—Wabash concreting plant, Ft. Wayne; slabs *241, Heavy concrete slabs make good railway bridges..... 277

Page

CONCRETE—Continued
—Walks, Tool for roughing.....(n) 288
—Warehouse partly wrecked by fire or explosion, Mullen & Buckley's, Far Rockaway *956
—Water main, Kan. Cy. Mo.....(n) 578
—Well, Lining 114-ft., with precast concrete rings *608
—Winnipeg aqueduct cracks..... 716
—Yadkin development work.....*922, 951
—Youngstown Sheet & Tube office building—Concreting with Jaeger system dump car and inclined tower.....*174

Condemnation, Excess, Los Angeles. Mohler. *20
Condemnation—Hartford water case..... 246
Condenser tubes, Brass—Cracking and its cure, Detroit Edison plant. White..... 87
Condensing plants, Ingersoll-Rand.....(n) 48
Condensing water, Deep-well—Layne & Bowler installations..... 779
Condron, T. L. Concrete-building cost 885, 954, 1043, 1193
Connell, W. H. Phila. Highway report 17, 27, 181
Conradson, P. H. Emulsification value of lubricating oil..... 136
Conservancy, Ohio. See "Ohio."
Conservation of natural resources, Combinations for.....1144
Conservation, Water-power 367, 999, (ns) 190, 430
Construction features used by Ferro Concrete Const. Co.....*991, (erratum n)1193
Construction machinery, New lubricating system for; Davis lubricator. Lawrence.....*317
Construction plant, Yadkin devel.....*922, 951
Construction work. Cleary-White daily field reports on. Hailey *994, So. Ry. contractors' *897
Construction work, Portable steel buildings on, Trussed Concrete Steel Co.'s.....*585
Continental & Comm. Bank, Chi.—Altering columns *1170

CONTRACTS AND CONTRACTORS
—Bridge-falsework drawings, Result of failure to submit, Warren, Penn.....(n) 430
—Bridges damaged by floods, Contractor discusses 1233
—City contracts, No bidders on, Indianapolis, etc.....1044
—Daily record of job, How So. Ry. contractors Sheahan and Lane keep *897, Cleary-White Const. Co.....*994
—Estimate, Inaccurate, vitiates time-penalty clause 53
—Kansas—Decision requiring fair competition in bridge contracts 201, Road maintenance by contract. Moone..... 204
—Municipal-contract specifications, Patents in; Imhoff tanks. Miller.....1239
—Nashville paving litigation.....(n) 210
—Naval contracts on cost-plus-a-percentage basis.....1143, (n) 1154
—Naval specifications, Modernizing..... 512
—Navy wants contractors' advice on contract provisions .....(n)1154
—Office, Portable steel *585
—Postcard advertisement Bent's.....(n)*1042
—Progress on construction, Specifying, Calumet sewer, Chi.....(n) 364
—Santa Monica, Calif., paving bids in competition with contractors.....(n) 577
—Wanted: contractors—Ky. roads. Wiley.. 616
—Yadkin development work.....*922, 951

Conveying coal and ore. Gilpin..... 169
Conveying—Phila. piers package elevators.*406
Conveyor, Burch wagon-loader with belt (n)*336
Conveyor, Freight, Astoria pier.....*699
Conveyor—Spoil escalator, Twin Peaks tunnel*637
Conveyors and stackers, Jeffrey.....(n)*1108
Conveyors, Bucket, feed concrete mixer, Nashville *1036
Cook Co., Ill.—Sewage-treatment plant at institutions. Ashley.....*296
Cooke, M. L. The city and its utilities..... 816
Cooling tower, Largest, Wheeler.....(n) 578
Cooper, H. L. Que. bridge disaster..... 622
Co-operation, Engineering, comm.....(n) 674
Co-operation saves pavements, Chi..... 130
Copeland, W. R. Nitrogen from sewer sludge 665, 663
Copper-sulphate treatment, St. Paul water-supply. Huff..... 104
Corpus Cristi causeway damaged by storm *815, (n) 430
Corrosion. See "Iron and steel corrosion."
"Corrosiron" anti-corrosion iron.....(n) 336
Corrosion, Submerged metal, Panama locks..1005
Cost-plus-a-percentage basis, Naval contracts on .....1143, (n)1154

COST DATA, METHODS ETC.
See also "Accounting."
—Alaskan Ry. contract prices..... 995
—Armor-plate cost accounting..... 83
—Asphalt-pavement costs with municipal plant, Spokane..... 375
—Asphalt pavements, Low-priced.....(n) 715
—Bridge abutments—Piles vs. increased depth 270
—Cable system, Dump-wagon.....*273
—Canal-work costs, Imperial Val.....(n) 333
—Cleveland municipal lighting results..... 603
—Coffer-dams, Troy.....*494,*533
—Concrete jobs, Small, Railway experience 849
—Docks, Astoria, Ore., municipal.....*699
—Dredge, Design and erection costs of American steel knock-down..... *6

Page

COST DATA, METHODS, ETC.—Continued
—Factory buildings of timber and concrete. Davidson, Natl. Lumber Mfrs. Assoc., Condron 884, McCullough 954, Rapid price changes affect problems 1043, Building in Wilmington, Del. Muhlhausen...1193
—Garbage disposal, Danville, Ill..... 685
—Garbage disposal, Los Angeles.....*680
—Grouting Catskill Aqueduct tunnels.....*200
—Motor-car operation, Ford.....(n) 176
—Motor-truck haulage, Ariz..... 271
—Night and day work compared; Michel on C. & O. Nor. experience, etc., 323, Whitney 506, Shaw 606, Hailey 654, McDonald 798
—Panama Canal report.....1004
—Pavements, Asphaltic-concrete, Cost analysis of, Albany, Ore. Penland..... 103
—Pavements Concrete, Sioux Cy., Ia.....*168
—Pavements, Monolithic brick, cost records, Marshall, Ill. Paige.....*1218, *978
—Paving cost, Prorating, among property owners, Owensboro, Ky. Talbott..... *14
—Pile driving, Salamanca bridge.....*338
—Rail price raised, Steel.....(n)1010
—Railway supplies, Cost of.....(n)1221
—Ry. passenger-terminal cost. Bikle....(n)1215
—Road and terminal costs, Relation between. Neall 324, Rates that help cities at expense of country 129, Eliminating cost of transfers..... 415
—Road-building essentials.....(n) 866
—Road-building materials, Cost of testing, N. Y..... 455
—Road grading, Cheap, Utah..... *28
—Road-oiler operation, Motor.....(n) 274
—Road oiling, western N. Y.....*1021
—Road pavements, Cost of concrete and other permanent. Wulff 1240
—Roads, Computing cost of good.....(n) 471
—Roads, Gravel, Mich. Rogers..... 892
—Roads in arid West.....*480
—Sewers, Aids to estimating cost of vitrified pipe. Kirchoffer *780
—Street cut, Kan. Cy.; slides.....1171
—Street elevation, Astoria—Viaduct vs. fill. McClean 325
—Subway cost, Centre St. Loop.....(n)1041
—Survey, Portland, Ore.; benchmarks..... *55
—Tamping, Elec. track. Vaughan.....*946
—Terminal charges, U. S. waterways—Barge Canal study .....(n)1057
—Tile and brick sewers, St. Louis.....*1024
—Tunnel, East Riv., 60th St., Low bids.... 132
—Viaduct, Dunham road concrete.....*352
—Water-meter setting, Wilmington.....*447
—Well lining with concrete rings.....*608

Costa Rica Ry. bridge, Raising.....*1088
Cotten, S. M. Charts for eccentric loading on rectangular areas.....*1090
Cottrell dust-precipitation process.....*1222
Coulter, W. S. Slaughter-house sewage test plant Buenos Aires..... 837
Council Bluffs, Ia.—Hydrated lime pays at settling basins. Thornell *456, Catchbasin inlet ..... (n) *32
Counter, Concrete-elevator. Tailer.....(n)*852
Countersunk rivets. Fleming..... 496
County managers, Engineers as.....(n) 893
Coutlee, J. R. Are boats for lake and ocean traffic practicable?..... 713
Cracks, Shrinkage—Joint adhesion.....(n)*1235
Cram, R. C. Grooved girder rails.....*418
Crane, Byers' traction derrick.....*507
Crane Co.'s plant roofing..... 154
Crane, Large Whiting alt.-cur.....(n)*240
Crane, Locomotive, Laying water main with, Cleveland .....(n)*1042
Crane, Locomotive, on trestle pulls coffer-dam piles, P. & R. bridge.....*509
Crane, Loco., for heavy concrete bridge work, Rock Isl. Lines, Chi.....*1172
Crane, Zin-Ho light portable.....(n)*580
Cranes, Gantry, work on sewer. Salt Lake Cy. *97
Cranes, Traveler, Quebec bridge.....*302
Crank, Engine, welded at pumping station*1140
Creosote oil, Spot test for purity of. Cloukey, Murphy .....(n) 510
Creuzbaur, R. W. Surveying in Tex..... 955
Cross Cut. See "Salt River."
Croton water-shed area, Correcting. Brush 576, Wegmann, Vermeule 664, Crushed stone is dutiable.....(n) 770
Culvert building for 150-ft. fill, Southern Ry., Ga.....*850
Culvert, Largest, Storm King road.....*597
Culvert, Overflow, Tenn. turnpike.....(n)*610
Culvert-pipe concrete specifications..... 174
Culvert pipe, Sledding large steel, over Ariz. hills .....(n) *32
Culvert valves, "Calco" auto. flap.....(n)*676
Culverts, Iron, for arch construction, Ariz. roads *330
Culverts on roads, Vermilion Co., Ill.....*209
Culverts, Reinforced-concrete pipe used for, on various western railways.....*592
Cunningham, J. W. Asphalt-pavement costs 375
Cupper P. A. State engineer's river survey guides water adjudicators 5, Assessment method 975
Curb inlet, Large, Council Bluffs.....(n) *32
Curb inlet, Reinforced-concrete, San Antonio .....(n)*1042
Curbing, Computing paving outside curved. Lewis *463
Curbing, inlet, etc., Pueblo.....*77, (n) 224

Page

Curbs, Expanding concrete breaks, Florence, S. C. Maffitt.....(n)*708
Curve. See also "Diagram," "Charts," "Catenary."
Curve, Determining tangent of compound. Beal *993
Curve rule, Flexible, K. & E. .....(n)*288
Curve, 90-deg., Ill. highways, reducing speeds on vertical curves, etc. Bilger....*874, 901
Curved curbing, Computing paving outside. Lewis *463
Curves, Railway, measured on arc or chords. Raymond, Haynes 86, Kitts 324, Table of chords. West .....(n)1188
Curves, Reforming railway. Lavis..... 468
Cuts, Trimming, B. & O. R.R.....(n)*756
Cutting out sledge wedged in stone crusher, with torch.....(n) 364
Cutting torches, Wrecking heavy machinery by, Commonwealth Edison plant, Chi., *1040 *1045
Cylinder, Broken, repaired by autogeneous welding. McGrath..... *77

D

Da Camara, H. Bascule bridge for construction *31
Dabney, A. L. Supporting Miss. levee system 228
Dabney, T. G. Flood control 370, Engineers in politics 1001
Daily construction work records *897, Hailey.*994
Dallas, Tex.—Concrete paving. Meyers 706, Vibrolithic concrete paving *1120

DAMS
See also "Coffer-dam."
—Austin dam section criticized. Bartlett & Ranney 217, Wegmann to report....(n) 333
—Australia, Thin arch dam in. Nimmo..*712
—Calif. board urges state control of dams.. 259
—Charleston Lt. & Water Co—Overtopped earth dam fails, Goose Creek *232
—Check dams, Los Angeles Co.....(n)1154
—Colo. Riv. temporary rock-fill dam. Rockwood 622
—Concrete dam, New hollow, with subdivided water pressure, for Genoa, Italy and Rutenberg's patent.....*788
—Elephant Butte dam (n) 685, Outlet control. Teichman *1015
—Flood-prevention case, Miami Riv. See "Floods, Ohio."
—Goose Creek sandbag dam, Charleston, S. C., saved by canvas cover.....*360
—Grand Canyon, Surveying dam sites in *306, (erratum n) 371
—Grand Val. Project, Colo., Large steel roller-crest dam. Teichman *1, Ed..... *60
—Hetch-Hetchy dam site *137
—Kensico dam quarries. Smith.....*250
—Joliet dam water-power bids.....(n) 237
—Lake Toxaway earth dam fails..... 331
—Leakage underground from dam, Stopping by concrete wall, Black Riv. Village, N. Y. *459
—Lower Otay dam. See "Dams—San Diego."
—Multiple-arch dams in Sierra Nevadas—Pac. Power Corp.'s Gem and Agnew Lake dams *1157
—Naugatuck Riv. water storage.....(n) 626
—N. Y. Barge Canal dam, Seneca Falls.....*145
—Ohio Riv. lock and dam work—Lubricating construction machinery. Lawrence 317, Placing wood coffer-dams without driving. Shriver *1140
—Pittsfield dam contract case..... 53
—Plattsburg dam failure. G. M. B..... 84
—Pump, Drainage, foundation design is dam problem. Hutson *838
—Rochester (N. Y.) Ry. & Lt. Co.....*821
—Roosevelt dam evaporation study.....*200
—San Diego—Two new dams for water-supply 231, Rebuilding Lower Otay; bond election (ns) 1057, 1106, Plan to raise Morena dam *1112
—Schenectady dam fails for third time.....*817
—Sevier Bridge earth dam with sheet-steel diaphragm and cutoff, Juab Co., Utah....*398
—Southern Power Co.'s dams, N. C.....(n) 138
—Spaulding dam, Pac. G. & E. Co., to be raised. Mudgett.....*328
—Tres Cruces dam repair, Cavite; addition of buttresses, waterproofing, etc. Bennett.*1026
—Troy dam across Hudson—Timber and gravel coffer-dams. Watt *492, Steel sheetpile coffer-dams. Watt *533, Pulling steel sheetpiles. Watt *408, 613, Pile hammer. Watt.....*609
—Yadkin concrete dam, N. C. *917, 951
—Youngstown—Milton reservoir.....*1084

Danforth, G. H. Cost of steel work.....1169
Danville, Ill.—Garbage disposal. Greeley.... 684
Datesman, G. E. Most Phila. sewers new 181
Davenport, Ia.—Sewage disposal.....1237
Davidson, F. E. Cost of timber and concrete factory buildings.....884, 954, 1043, 1193
Davis lubricator *318
Daylight-saving movement .....1044, (n)1058
Dayton, O.—Miami flood-prevention hearing. Chittenden *906, 1055, 1093, Herschel 1190, (n) 674
De Laval pump, Montreal 133, 835
Deans, J. S. Que. bridge disaster..... 622
Debts, City—Census bulletin .....(n) 46
Debts, Curbing city and county, N. J..... 613

Page

Incinerator, Queens Borough *598, 1000
Decatur, Ill.—Electrolytic sewage tests. Shields .....370, (ns) 578, 674
Definitions. See "Nomenclature."
Dentist's bowl water rate .....(n) 926
Denver, Colo.—Raising settled bent of concrete viaduct *221, Pavement-construction records *271, Irrigation field laboratory. Sleight *1080, Legality of water-wks. municipal ownership .....(n) 333
Depreciation and obsolescence. Harshman, 842, 854
Depreciation discussed by A. I. E. E..... 962
Depreciation in accounting. Hurley.....(n) 59
Depreciation problems of utilities, Side lights on Barker.....1167, 1212
Depth-flow diagrams, Time saved in ditch design by. Hammond.....*802
Derrick car, Handling girders with.....*972
Derrick collapse drops stack.....*618, (n) 530
Derrick, Contractor's traction—Buyers' "Auto-Crane" *507
Derrick, Pipelaying with portable, Butte..(n)*364
Derricks, Platform for two, for open-dredging caisson, Bear Lake, Utah.....*408
Derricks, Power hoist for hand guy, Domestic E. & P. Co.'s .....(n)*432
Derricks, Tower, for erecting frames, P. R.R. freight station, Chi. *802
Des Moines, Ia.—River-front impvt. (n) 100, Inverted siphon .....(n)1091
Designing efficiency, Furniture layout increases *128
Desmond, T. C. Engineers in politics..... 445
Detroit, Mich.—Edison plant tube experiences 88, Old brick intake tunnel shows low Kutter factor. Maury, Horton *460, Sewers criticized 1149, Concreting train for street-railway work *1138, Grade-crossing work (n) 429, P. R.R. coming (ns) 530, 674, Experimental filtration plant.....(n) 578
Detroit Bureau of Governmental Research report—Do engineers need to eat?.....1189
Detroit-Sup. See "Viaduct" 234
Dewart, C. V. Mich. highway bridges *798, *990
Dewell, H. D. Timber-joint tests *111, *162, *796, Dangerous timber roofs.....*515
Diagram. See also "Charts."
Diagram for design of semi-circular flumes. Hammond .....(n)*1142
Diagram for hydraulic turbines, Babock's specific-speed *707
Diagram, Mass, for power and water-supply computations. Butcher *376
Diagram, Population expectancy. Moore....*844
Diagram, Vitrified-pipe sewer cost *781
Diagrams, Arch-crown thickness. Schwada..*880
Diagrams, Depth-flow, Time saved in ditch design by. Hammond *802
Diagrams for irrigation-ditch velocity and discharge. Douglass *72, Hinds *369
Diagrams of motor-truck load stresses on bridges. Childs *898
Diagrams, Stirrup-spacing, for concrete beams. Bailey *694
Diaphragm, Sevier Bridge dam steel *398
Diesel-engine excursion boat .....(n) 285
Differential dump-cars *640
Dike repair in Holland *773
Dinkey. See "Locomotives."
Dipper welded, Dredge. Rosselle .....(n)*320
District of Columbia (See also "Washington")—Study of garbage, rubbish and ashes. Osborn 294, *348, Public Buildings Comn. (n) 141
Ditch design, Time saved in, by depth-flow diagrams. Hammond *802
Ditch velocity and discharge, Curves for irrigation. Douglass *72, Hinds *369
Ditch—Velocity coefficients for dredged drainage canal. Hodges *1052
Ditcher, Browning railway, With three sets of engines .....(n)*335
Ditches, Building 600 miles of drainage, Little Riv. dist., Mo. *740, *76, 342
Divided authority, bad results 853
Diving helmets, Beer keg and kitchen boiler as *607
Doane, A. O. Air chamber protects venturi meter from pulsations.....*1184
Dock. See "Wharves and docks," "Harbors."
Dogs corrode bridge members *704
Douglass, L. R. Curves for irrigation-ditch velocity and discharge *72, Hinds.....*369
Draft-tubes, Forms for heavy, Spanish irrigation project. Braun..... *76
Drafting. See "Drawing."
Dragline excavator. See also "Earthwork."
Dragline rig, Improvised, Brevoort levee, Ind.*1139
Drain entrances, Ill. farm.....*209
Drainage and improvement assessments, Method of making. Cupper 975
Drainage and irrigation pumping station, Natomis Co.'s, Pritchard Lake, Calif.....*556
Drainage canal, Velocity coefficients for dredged, Blitzen, Ore. Hodges *1052
Drainage channel, L. V. terminal, Buffalo, built over. Hurlbut *436
Drainage-dist. levees, St. John *158
Drainage dist., Little Riv., Mo.—River diversion and flood control *342, Building 600 miles of ditches *740, Tracks for heavy excavators *76
Drainage, Elec. pumping plant for, Spring Lake dist., Ill..... 419
Drainage, Minn.—Straightening Root Riv..(n) 139
Draining North Holland after January flood. Spaander *773

Page

Drainage properties, Testing soils for, U. S. Dept. Ag. Haswell *211
Drainage-pump foundation design is dam problem, New Orleans. Huston *838
Drainage-pump test, West Sacramento. Grunsky *8, Gregory 180
Drainage, Rural highway. Bilger.....*874, 901
Draney, J. R. Standard asphalt 278

DRAWING, DRAFTING
—Brown prints white, To mark ....1141, (n)1001
—Curve rule, Flexible, K. & E. .....(n)*288
—Isometric drawing form, Two Rivers ..(n)*676
—Pen, Norrman's rapidly adjustable *273
—St. Louis Dept. of Public Wks—Furniture layout increases designing efficiency *128
—Tracing cloth, Defiance "Stirling" impvd.(n) 48
—Waterproofing drawings. Bell 808, Salmon.1037
—Wellman-Seaver-Morgan departmentalized shop, drafting-room practice *218

Drayer, C. E. Cleveland Engineering Soc. to the rescue 328
Dredge, Design and erection costs of American steel knock-down *6
Dredge dipper repaired by welding. Rosselle .....(n)*320
Dredge, Ladder, for snow, Chilean Trans-Andean Ry. Lucy .....(n) 843
Dredge pins, Strong Young .....(n) 633
Dredge, Seagoing barge-emptying, for China. Coleman *170
Dredge, Hydraulic hopper, with unloading machinery, Manitowoc, for Hydraulic Sand & Transit Co. *1211
Dredge work, Hydraulic, St. John levee dist., Mo. *158
Dredge work, etc., Little Riv. drainage dist., Mo. *740, *76, *342
Dredged drainage canal, Velocity coefficients for, Blitzen, Ore. Hodges *1052
Dredges, Artesian well to float .....(n) 80
Dredging caisson, Pumping-station foundation, Bear Lake, Utah.....*98, *172, 178, *408
Dredging for coal, Penn. rivers .....(n) 644
Drift catcher, Concrete, at Erie, Penn. Seelye *795
Drifting-sand filters, Toronto 561, *566, *803, 856, (n) 464
Drill barge on canal work in Everglades. Phelps *704
Drill holder, Jackson, Schmitz & Shanks (n)*1156
Drill holes for plumb lines, St. Louis sewer tunnel. Gans *410, Materials chuted through them to mixer. Horner *705
Drill-sharpening shop operating methods—Prize offer 805, 997, Award.....1237
Drill tests, Chi. Pneu. Tool Co.'s hammer(n) 708
Drilling anchor-bolt holes by Ingersoll-Rand gasoline-air outfit, N. Y. Edison transmission line. Hicks *54
Drilling contest, Calif. mining .....(n) 29
Drilling, Ring, Rogers Pass *411
Drilling, Subaqueous. Phelps *171
Drilling to pin rock slab *359, 367
Dry-dock See also "Wharves and docks."
Dry-dock excavation, Prince Rupert *171
Dry-dock, Balboa, Panama 1004, Resurfacing floor *755
Dry-dock rules, Panama .....(n) 842
Dry-dock, South Boston, Coffer-dam fails 237, (n) 429
Drying sludge by centrifuging *1126
Dublin, Ireland—Rebuilding plans.....(n) 429
Duck Val. Project survey *490, 905
Dudley, P. H. Rail-fissure cure 332, 365
Duggan, G. H. Que. bridge erection..... 468
Duluth, Minn.—Replanning. Patten *845
Dump-car, Differential elec. .....(n)*192
Dump-car, Improvised, C., B. & Q.....*1184
Dump-car rerailer, Johnson .....(n)*432
Dump-car types used on construction work *581, 611, *640
Dump wagon. See also "Motor vehicles."
Dump-wagon cable system. Owen *272
Dump wagons, superior to carts, distributing concrete 79
Dumping, Flat cars with false floors for, Crossett Lumber Co.'s .....(n) 412
Dumping trestles, So. Ry.....*948, (n)1236
Dunlap, W. H. Railroad valuation surveys may be made useful 36
Durant, Okla.—Electrolytic sewage-treatment tests *547
Durham, H. W. Repetitious road discussion 416
Dust precipitation, Cottrell, cement.....*1222
Dutton, E. R. Bleeding wood blocks *737
Dynamometer—Water-brake design..... 378

E

Earl, G. G. Making water consumers pay for sewer service.....512, 1193

EARTHSLIDES
—Gt. Nor. slide, Cascade Mtns. .....(n) 935
—Panama Canal slide .....(n) 625
—Panama slide critics, Goethals on—Annual report 986
—Street cut, Slides in deep, Kan. Cy.....1171
—Turners Falls, Mass., canal-lining slide and repair *1031, 1046

EARTHWORK
See "Roads," "Dredge," "Shovel," "Sewers," "Dams," "Levee," "Car."
—Bucket, Clamshell, closed by steam engine, Portland, Ore.....*316

Page

EARTHWORK—Continued
—Ches. & O. Nor. night-work cost 323, Experience elsewhere. Whitney 506, Shaw 606, Halley 654, McDonald 798
—Cuts, Trimming, B. & O. R.R. .....(n)*756
—Dam, Earth, Sevier Bridge, Utah.....*398
—Derrick, Byers' "Auto-Crane" traction....*507
—Dragline rig, Improvised, Brevoort levee, Ind. *1139
—Excavator and wagon loader, Koehring, for street grading, Chi. *495
—Excavator, Big Lübecker, replaces gold dredge in Klondike. Young *74
—Excavator, Pawling & Harnischfeger's "Crawford" dragline .....(n)*240
—Excavators, Tracks for heavy, on river diversion, Little Riv. drainage dist., Mo. *76, Description of work *342, Building 600 miles of ditches *740
—Fill, Long, built from borrow, Vandalia R.R.*800
—Gravel layer, Tractor and plows dig out. Bullard .....(n)1041
—Levee work, Miss. Riv., Wight *1114
—Levees, St. John dist., Mo.—Hydraulic fill and wheeled scrapers *158
—Minneapolis pipe laying with trenching machine cleaning up ditch .....(n)*224
—Park grading by day labor—Columbus Park, Chi. *966
—Pole holes, Blasting .....(n) 412
—Railway ditcher, Browning, with three sets of engines .....(n)*335
—Shovels, Digging end of power 172
—Shrinkage, Engineering contractor talks on earth. Baird 850
—So. Ry. relocation, Heavy grading on *1075, (n)1236
—Street elevation, Astoria—Viaduct vs. fill. McClean 325
—Trenching for telephone conduits, Wis., with Pawling & Harnischfeger machine *1068
—Trenching machines, American, in European war. Miller..... 791
—Trestles, Dumping, Southern Ry.....*948
—Wagon loader and portable dragline excavator for roadwork, Barbeau & Werring's Albrecht.....*78 (erratum n) 469
—Wagons, Snatching, in two lifts, Underwood Service Bldg. cellar, N. Y.....*560
—Wagons, Snatching, out of pits, N. Y. subway. Fouhy *124

East Riv. tunnels. See "Tunnels—N. Y. Cy."
Eccentric loading on rectangular areas. Charts for. Cotten *1090
Echo Canyon, Utah, New line of Union Pac. through *700
Ecuador, American cement in .....(n) 242
Edging for asphaltic pavements .....(n)*464
Edinburgh—Cable railways.....(n)1074
Edison station, Brooklyn. See "Brooklyn."
Edsall, H. J. Package elevators.....*406

EDUCATION
See also "Engineering schools."
—Applications for employment 37, 258, 275
—Education in engineering. Jacobus.....1152
—Engineering Education, Soc. for Promotion of—Student statistics .....(n) 139
—Engineering education, What is the road to progress in? Holden 873
—Executive officers' training school..... 853
—Highway engineering, Conference on education in .....(n)1056
—Misfits, Avoiding professional. Wilson 388, 414, Buff 565, Ruggles..... 713

Eight-hour day, Railway 321, 413, 465, 714, 757, (n) 94
El Paso, Tex.—Air-lift pumping.....*204
Elastic limit—A. S. T. M. discussion.....41, 89

ELECTRIC RAILWAYS
See also "Subways," "Elevated railways," "Rapid-transit."
—Am. Elec. Ry. Asso. convention 762, (n) *996, Standardizing valuation terms.... 787
—Boston car through draw 952, (ns) 913, 1011, New tunnel service .....(n) 1010
—Braking with elec. motors—Linebaugh's review of progress 902
—Bridge floor, Erie Canal, Syracuse.....*545
—Car, Differential dump .....(n)*192
—Car ferries .....(ns) 475, 616
—Car, Rail-and-road, Bradford, Eng. ....(n) 397
—Cars, Seatless, London.....1128
—Chi., Mil. & St. P.—Elec. traction a success; locomotives *24
—Cincinnati rapid-transit surveys .....(n) 674
—Cleveland bridge wrecked by car derailed at curve *718, Should street-car bridges be designed for derailment? 711, Bridge inspection .....(n)1058
—Concreting train for Detroit street-ry. work.*1138
—French lines, Westinghouse motors for (n) 635
—Gt. Nor. electrification .....(n) 914
—Kan. Cy.—Cleaning old ballast.....(n)1236
—Minneapolis, Profit-sharing franchise asked in 1201
—Minneapolis street railways—Value....(n) 763
—Rails, New grooved girder—Brooklyn, Baltimore and A. E. R. A. heads compared...*418
—St. Gothard electrification .....(n) 622
—St. Louis street-ry. track without spikes or bolts; tie-plates with lugs.....*1217
—St. Louis taxation dispute .....(n)1057
—Sioux Cy. concrete paving.....*167
—Switch, Call ry., on Bklyn. R. T. .....(n)*772

Page

ELECTRIC RAILWAYS—Continued
—Tunnel under Chi. Riv., Lowering.....*968
—Worcester, Mass.—Flushing streets from trolley cars *1205

ELECTRICITY
See also "Rates."
—Am. Inst Elec. Engineers—Appraisal and depreciation discussed 962
—Brit. power stations, Linking up.....(n)1166
—Cable armored with composite lath ....(n)*628
—Cement-dust precipitation, Cottrell.....*1222
—Cement mill, Oregon Portland Cement Co.'s, electric-driven. Findlay *1194
—Circuit-breaker, G. E., 20,000-amp. d.c. (n)*772
—Cleveland municipal lighting-plant results. Ballard 603
—Concrete conduits—N. E. L. A. report (n) 669
—Generator outfits with automobile engines, Zin-Ho .....(n) 240
—Grounding conn. Hickey & Schneider's "Burn-Boston" carbon .....(n) 964
—Insulating material, "Condensite-Cellulite" (n) 1156
Insulating paint, Union Insul. Co.'s....(n) 868
—Lamp, Hirach portable inspection.....(n) 192
—Lamp sales, Incandescent .....(n) 307
—Lamps, Lux "Daylight" elec.....(n) 432
—Lighting freight yards—Asso. Ry. Elec. Engineers *1134
—Lighting plant, Wallingford municipal (n)1053
—Lighting Statue of Liberty .....(n)1057
—Lighting fixtures, Cent. Elec. self-aligning (n) 964
—Lighting industry, Rapid changes in—Insull's address; types of generating machinery of Commonwealth Edison Co., Chi. *1045, Wrecking old machy. *1040, 45,000-hp turbine *52
—Los Angeles municipal ownership ....(n) 914
—Los Angeles power-line suits ended.....1200
—Melbourne municipal lighting plant....(n)1131
—Meter station, Westinghouse outdoor, for high tension lines .....(n) 628
—Natl. Elec. Lt. Asso. 30, 633, 816, (ns) 307, 669
—N. Y. City rates .....(n) 914
—Ont. Hydro-Elec. power shortage (n) 233, To enlarge system 478, To develop Chippewa Creek .....(n)1056
—Pumping plant for drainage, Spring Lake dist., Ill..... 419
—Pumps, Well, Aurora, Ill.....*1122
—Relays, G. E—Solenoid-control (n) *580, Reverse-phase, to protect against reversal of motor .....(n)*868
—St. Louis municipal light plant ..(n) 237, 876
—Soldering iron, Clemens .....(n)1156
—Switchboard, G. E safety-first.....(n)*1204
—Tampers, Track, on N. Y. Cent. Vaughan.*946
—Transmission-line anchor-bolt hole drilling, N. Y. Edison.....*54
—Transmission towers, Erecting. Allison..*752
—Tunnels for cables, Chicago—N. E. L. A. report 633

Electrolysis. See "Iron and steel corrosion."
Electrolytic sewage tests, Elmhurst, N. Y., and Decatur, Ill. Shields 370, (ns) 578, 674
Electrolytic sewage-treatment tests, Durant, Okla. *547
Elephant Butte dam (n) 685, Outlet control. Teichman *1015

ELEVATED RAILWAYS
—Boston—Capital and finance (n) 860, New tunnel service.....(n)1010
—Chi. rapid-transit plans; map.....1104, *1148
—N. Y. Cy.—Brooklyn—Light-exclusion by plate girders .....(n) 863
Inspecting track by periscope, Queens..(n)1186

Elevator, Chain Belt barrel, for Standard Oil Co. .....(n)*820
Elevator counter, Concrete. Tailer ....(n)*852
Elevator gates, Paterson-Leitch "Steelite" pressed-steel .....(n)*916
Elevator guide-rail lubricator, Lyne ....(n) 96
Elevator, Twin Peaks tunnel spoil.....*637
Elevators, Cargo, Italian freighter *210
Elevators, Continuous Link-Belt package, on Phila. piers. Edsall *406
Elmhurst disposal-plant report 91, Shields.. 370
Employment-agency licenses, Penn. .....(n) 625
Employment, Applications for—Notepaper defended 37, Experience with applications. Bock, of Morgan Eng. Co. 258, How not to apply 275
Engine. See "Engines."
Engineering ability, Marketing. Harding.... 862
Engineering Asso of South 1154
Engineering books and pamphlets, Monthly guide to 322

ENGINEERING COMPETITIONS
—"Engineering News" prize offer 805, 997, 1187, Awards 1237
—Engineering students, Chi. Asso. of Commerce's prize offer to .....(n) 817
—Road-direction sign, Ill. .....(n)*1092

Engineering Coöperation committee .....(n) 674
Engineering dept. of a railway, Organization of. Hendricks 989

ENGINEERING ETHICS
—Minn. Engineers' and Surveyors' Soc. resolutions .....(n) 279

Engineering Foundation—Secretary .....(n) 625

Page
"Engineering News" prize offers 805, 997, 1197, 1237, As a Christmas present.....1143
Engineering problem without a precedent.. 709

ENGINEERING SCHOOLS
See also "Education."
—Ariz., Univ.....(n) 625
—Calif., Univ .....(n) 913
—Columbia—United Engineering Societies..1197
—Cornell—Experiments with submerged orifices and tubes *825
—Education in highway engineering, Conference on.....(n) 1056
Executive officers' training school 853
—Harvard-Technology .....178, (n) 913
—Ill., Univ.—Activated-sludge expts. Bartow, Mohlman, Schnellbach *972, 110, Laboratory explosion (n) 320, Ry. advisory board (n) 913, Ceramic Engineering Bldg. (n) *1105, Gypsum roof-slab tests.*1173
Internatl. Corresp. Schools .....(n) 722
Iowa State Coll.—Street signs *16
Iowa, Univ. .....(n) 625
—Johns Hopkins—Rockefeller Foundation's School of Hygiene 131, Outdoor acoustics. 179
—Lewis Inst. cement research .....(n) 673
—Mass. Inst. Tech.—Outdoor acoustics at dedication 178, Dormitories.....(n) 913
—Mich., Univ.—Weir formulas.....*895
—Minn., Univ.—Free engineering services.(n)1151
Misfits, How avoid professional? Wilson 388, 414, Buff 565, Ruggles 713, Holden 873
—Oglethorpe Univ.....(n) 625
—Penn., Univ., Reservoir-mouthpiece expts. Pardoe *520, Outside work of faculty (n)1010
Prize offer to students.....(n) 817
Student and Govt. free engineering service. Barnett, Glennan 36, Norcross.. 180
—Students, Over 30,000 engineering.....(n) 138
—Tenn., Univ.....(n) 913
—Tex., Univ.....(n) 625
—Wash., Univ.....(n)1105
Wentworth Inst.—Concrete foremen's courses .....(n) 382
—Western Reserve Univ.....(n)1010

ENGINEERING SOCIETIES
See also societies by name.
—Columbia Univ. United Engineering Societies 1197
—Coöperation committee .....(n) 674
—Legislation, Should technical societies influence? Hess, Q. E. D. 278
—Minn. Joint Engineering Board .....(n) 578
—National Engineering Societies and Academy of Sciences .....(n) 237
—National Research Council .....(n) 720
—National societies and local sections; influence on public questions, etc 806
—Organization of engineers for public service 672
—Politics, Members in.....445, 1001, 1145
—Road discussions, Repetitious 177, Draney 278, Durham..... 416
—United Engineering Soc. building, Enlarging, for A. S. C. E. 425, Million dollars for library.....(n)1009
—Water-power legislation, Action on.999, (n) 430

Engineering work and state highway legislation 1143

ENGINEERS
—Am. engineers developing foreign trade..1197
—Blakeley, G. H., Pres. Bethlehem Steel Bridge Co.....*234
—Boston engineers' reinstatement, 35, 45, (ns) 94, 333
—British engineers in Canada..... 613
—Canadian enineers object to appointment of aliens 711, Sullivan..... 853
—Chi engineers ask higher salaries.....1201
City engineer's office, Registering kicks at.. 437
—Civil-service exam., Junior Engineer.....1074
—Cleveland public-service directors, Engineers needed for—Engineers' advice not heeded. Fesler..... 866
—Competition—Govt. and student free engineering service. Barnett; Glennan, Pub. Health Service 36, Norcross..... 180
—Competition, Govt. engineers, N. Z.....(n) 305
—Consulting services free, Univ. Minn....(n)1151
—County managers, Engineers as.....(n) 893
Detroit Bureau of Governmental Research report—Do engineers need to eat?—Their pay 1189
—Engineers can vouch for this; King on local residence requirements for public office 413, No residence restrictions. Green... 565
—Established engineer, What he owes to beginner. Randolph.....1102
—Field-artillery service should attract engineers. McCullough 353, Gregg.....*564
—Highway engineers, Demand for.....(n) 593
—Highway impvt., Mo.—Engineer's pay limit. 757, Engineers unpopular.....(n)1021
—Ill. Junior Highway Engineer—Civil-service exams. without leaving home.....(n)1200
—Juror, Engineer as. Fleming 967, Owen...1098
—License law, Tex., engineers discuss..... 864
—Marketing engineering ability. Harding... 862
—Military emergency, Using engineers in present. Black 36, Opportunities for civilians to become engineer officers. Black 615
—Military Engineer 2nd Lieutenants appointed .....(n)1202
—Military Engineers, 22nd N. Y.—Camp Whitman water-supply *498, Make good. 513, Information.....(n) 190

Page
ENGINEERS—Contniued
—Military Corps, Ill., on Mex. border.....10
—Military—Engineer Officers' Reserve Corps—Act effective 92, Organizing the Corps—Information .....
—Misfits, Professional, How can they be avoided? Wilson 388, 414, Buff 565, Ruggles 713, Holden.....
—Montreal municipal water-power plant condemned by engineers *1048, (n) 1010, "Butting in" on public question.....10
—Navy wants designing engineers.....10
—Organization of engineers for public service
—Philadelphia wants engineers.....(n)
—Politics, Engineers in. Desmond 445, Dabney 1001, Sherman, Spaander, Randolph 11
—Railway chief engineers, Two—Begien and Owen 42, *1
—Road construction, Competent engineers needed for. Houston.....(n)
—Salesmanship, Engineers and. Lowry..(n)11
—Success through neatness. Henry.....(n)
—Technical journal, How the engineer should use the. Fleming.....
—U. S. Army Corps of Engineers, Expanding. (n)
—West Point graduating class.....(n)
Engineers Soc. Western Penn.....1169

ENGINES
—Aëro. motor, Knox Co.'s Trego 300-hp..(n)*1
—Automobile engine, White 4-cyl .....(n)12
—Diesel-engine excursion boat.....(n)
—Ford gas and steam plant.....10
—Oil engines driving pumps and generators, Sioux Falls.....*8
—Oil in engine cylinders; consumption of Rockwell Mfg. Co.'s Nordberg engine, 663, B. V. Nordberg.....
—Producer-gas engines drive water-wks. pumps, Wheaton, Ill.....*
—"Unaflow" engines, Nordberg Stumpf, for rolling mills.....(n)
—Zin-Ho outfits—Portable internal-combustion engine driven air compressor (n) *192, Pumps and generators with automobile engines.....(n)
English Channel tunnel.....(ns) 430, 1058
Erie, Penn.—Drift catcher *795, Flood channel .....(n)
Escalator, Twin Peaks tunnel spoil.....*
Esplanade, San Francisco.....*
Estimate, Inaccurate, vitiates time-penalty clause
Evans, W. S. Georgian Bay canal.....*604, 7
Evaporation studies, Weather Bureau. Kadel, Abbe .....*
"Evaporimeter" for water level, Hoff *974, Irrigation field laboratory, Denver.....*
Everglades, Drill barge on canal work in. Phelps .....*
Everham, A. C. River-bank mattress.....*
Examination, U. S. Civil Service, for Junior Engineer .....
Examinations, Is passing, the chief end of man? Merit.....
Excavation, Subaqueous rock, from platform, Grand Trunk drydock, Prince Rupert. Phelps .....*
Excavator, Excavation See "Earthwork" and cross-references.
Excess condemnation and city planning, Los Angeles. Mohler.....
Executive officers' training school.....
Expansion-bolt imitation case.....
Expansion joints, Capitol terrace.....
Expansion sockets, Tenax bolt and screw. (n)*
Expectancy curve, Population. Moore.....*
Explosion. See also "Accidents" (various subentries).
Explosions in grain separators.....
Explosions, Munitions, N. Y. Cy. *236, Safeguarding large cities from explosion disasters .....
Exposition, Panama-Pac.—Timber-joint tests. *111, *162, *796, Building takes 25-mile cruise *381, To convert site into park..(n)
Extensograph shows that bridge leans to side.*

F

Factory buildings of lumber and concrete, Cost of. Davidson, Natl. Lumber Mfrs.' Asso., Condron 884, McCullough 954, Ed. 1043, Muhlhausen 11
Fate Co.'s gasoline dinkey.....*
Fatigue hypothesis, Data for exponential. Moore, Seely.....
Federal. See "U. S.," "Laws," "War."
Feeder for water-works chemicals, Gauntt dry .....(n)
Ferguson concrete-dock patent.....
Ferries, Electric-car.....(ns) 475, 6
Ferro Concrete Const. Co. methods *508, *991, (erratum n)11
Field-artillery service should attract engineers. McCullough 353, Gregg.....*
Field laboratory, Irrigation, Denver.....*

FILING
See also "Accounting."
—Loose-leaf filing system for city surveys, San Francisco Owen.....*
—Pavement-construction records, Denver....*
—Survey field notes, Loose-leaf.....*
—Wellman-Seaver-Morgan drafting room....*

Page

Long, built from borrow, Vandalia R.R..*800
Filter. See also "Water pollution and purification," "Sewers."
Filter plant, Cleveland *732, Arch collapse, *886, (n) 141, Jacketing clearwater basin, (n) 1009, Foundation settlement 1095, *1099, Quick repair bids.....1150
Filter standards, Mechanical—A. S. M. E. report by Fuller.....1148
Filter suit, Minneapolis wins.....951, 960
Filters and typhoid, St. Louis. Potter.....1047
Filters, Drifting-sand, Toronto 561, *566, (n) 464, Water lifts sand from cars. Gore, *803, Mechanical agitation unsuccessful. Nordell 856
Filters, Sprinkling, Cleburne. McDonnell...*1028
Finance—U. S. the world's reservoir of capital 1093
Financing Boston Elevated ry.....(n) 860
Finch, J. K. Simple azimuth determinations.1139
Findlay, D. C. Ore. cement mill.....*1194
Fire at Phoenix, N. Y.....(n) 674
Fire. Creosoted-timber floor, racks Mo. Riv. bridge, St. Charles.....*670
Fire-hydrant chambers, Salt Lake Cy..... *66
Fire, Mullen & Buckley concrete warehouse, Far Rockaway, N. Y.....*956
Fire-patrol truck, Forest.....*473
Fire-prevention statistics, cities.....(n) 963
Fire-protection discussion, Am. Water-Wks. Asso. 33
Fire protection, Grading water-wks. for—N. E. Water-Wks. Asso. discussion..... 571
Fire rates, Will improvement in water-wks. reduce?—Maury's question, Willmette, Ill.. 901
Fire retardant, Cement-milk.....(n) 128
Fire risk—Standard school plans.....(n) 817
Fire-service pumping station, Bost.....(n) 626
Fire sprinklers, Valve for dry-pipe, Genl. Fire Ext. Co.'s.....(n) 240
Fire vehicles, Electric, Paterson.....(n) 887
Firebrick, Testing. Nesbit, Bell..... 135
Fireproof concrete ashpits.....*635
Fireproofing steamer decks.....(n) 375
Fires, Spotting snowshed, So. Pac. alarm system and observatory.....*458
Fischer, E. G. Level rod.....*895
Fish screens, Irrigation—ditch.....(n) 448
Fisheries Bureau's steel car.....(n) 175
Fissures, Cure for transverse.....332, 365
Fishy sewage-treatment scheme. Observer... 855
Fittings, Alloys for high-pres. Sleeth....(n)1092
Fittings, Insuluminum anti-corrosion.....(n) 288
Flag, Artificial breeze waves.....(n)*996
Flag-pole design, U. S. Navy.....(n) 804
Flagman, Union closed-circuit automatic, (n)*1204
Flange oiling, Loco., to save rails..... 853
Flap valves, "Calco" automatic.....(n)*675
Flat slab. See "Slab," "Concrete."
Fleming, R. Countersunk rivets 496, How the engineer should use the technical journal, 862, Engineer as juror.....967, 1098
Fletcher, R. Masonry arch.....*368
Flood and storm, Tex. coast.....(n) 429
Flood channel, Mill Creek, Erie (n) 286, Drift catcher.....*795
Flood conference, Penn.....(n) 818
Flood control and river diversion, Little Riv. drainage dist., Mo. *342, *740, Tracks for excavators *76
Flood-control bill and Miss. levee system. Dabney 228
Flood-control report, A. S. C. E.—Comment. Dabney 370
Flood from broken dike near Alameda....(n) 285
Flood, Jan., Draining North Holland after....*773
Flood plays with pipe-laying job, Minneapolis *1038
Flood prevention, Kan.—Comm. report....(n) 530
Flood prevention, Olean, N. Y..... 721
Flood protection, Santa Ana Riv.—Rock-filled bags *79, Used in Jamaica, etc. Park..... 468
Flood-protection straw vote, Pomona, Calif., (n) 817
Flood-protection weir, Sacramento. (errata n) 325
Flood—Schenectady dam fails.....*817
Flood, Straightening Harrisburg bridge I-beams bent by.....*385, *764
Flood washes out bridge falsework, Little Colo. Riv.—Completed from suspended forms *786
Flood-water diversion of Los Angeles Riv. from harbor.....(n) 578
Flood, West Va.—Coal Riv., etc. 321, 331, 381, Bridges, etc., damaged.....*428
Floods, Calif.—State control of dams 259, Check dams, Los Angeles Co.....(n)1154
Floods, Imperial Val.—Diversion dam..... 622
Floods, Ohio—Battle over Miami prevention plans. Chittenden *906, (n) 674, Plan approved 1055, A sound court opinion 1093, Scioto Riv. widening, Columbus 1055, 1093, Ohio Conservancy act. Herschel.....1196
Floods, San Diego Co., Calif.—Salvaging pumping plant, San Luis Rey River *125, Restoring well and pumping system, Mission Val. *980, New water-supply dams 231, To raise Morena dam *1112, Clarifying city water (n) 189, Rebuilding Lower Otay dam, (ns) 1057, 1106
Floods, Southern—Rains, bridge destruction, etc. 140, *183, *232, (ns) 429, *560, 756, Lake Toxaway dam, N. C., fails 331, Goose Creek dam, Charleston, saved by canvas cover *360, Rail joints stood washout *490, Rainfall exhibited by charts. Henry *886, Heavy rainfalls elsewhere compared. Allen, 1001, Yadkin development damage.....*924
Floods, Southern—Contractor discusses bridges damaged 1233
Floor, Concrete, falls after early removal of forms, N. Y. building.....*1050, (n)1106
Floor, Concrete, St. Louis bridge.....*1230
Floor, Concrete, tested by stack fall. Blood, *618, (n) 530
Floor cracked by settlement, Load test of concrete. Byrd.....*11
Floor failure, Flat-slab, due to poor brick wall columns, Roxbury school shop. Thompson *262, Wolf, Von Mueller..... 611
Floor, Insulating concrete, under boilers, by Ferro Concrete Const. Co.....*508
Floor, Roughening concrete, for resurfacing. Balboa dry-dock. Hirschberg.....*755
Floor, Shallow railway, on Erie Canal bascule bridge, Syracuse. Hayden.....*545
Floor, Turner flat-slab pat. decisions....720, 769
Flooring, Carter "Bloxonend" wood-block factory .....(n)*724
Flooring, Wood, Chi. bascule bridges.....*220
Floors—Flat-slab test, Seattle. Turner 84, Lord 85, Godfrey..... 279
Floors, Gravel covers on bridge 330, C. E. V., 468, Longshore 616, Nagel..... 712
Florence, S. C.—Sand-clay street surfacing from sewer trenches. Mafflitt *752, Expanding concrete breaks curbs.....(n)*708
Florida—State highway work 259, Drill barge in Everglades. Phelps.....*704
Flour bag, Steel, as tank.....(n)*610
Flow, Water. See also "Water measurement," "Hydraulics."
Flow meter, Variable-slot, Spray Engineering Co.'s Vaughan.....(n)*480
Flue gas—Bacharach CO_2 indicator.....(n)*916
Fluids, Effect of heat on flow of. Butcher, *326, 611
Flume intakes and outlets, Hydraulic principles of. Norton *541, Kennison 1096, Hinds *1097
Flume, Measuring, U. S. Dept. Ag.....*270
Flumes, Curve for design of semi-circular. Hammond .....(n)*1142
Flumes, Rectangular wooden. Stevens.....*1160
Flumes, Timber and steel, Goose Lake Val. system. Heron *503, *504, Rice..... 809
Flumes, Very large metal, Hardesty Co.'s Hess, in Grand Valley Project.....*127
Flushing streets from trolley cars, Worcester, Mass. *1205
Flushing streets with portable water mains..*659
Footing walls, Concrete, built by Johnson & Co., Chi.....*362
Ford, G. B. N. Y. zoning regulations..... 405
Ford plant, Detroit, combined steam and power station.....1085
Foreign trade. See "Trade."
Foreign trade, U. S.....(n) 491
Foresight for accurate work. Gansmann..(n)*660
Forest fires, Spotting, near So. Pac. snowsheds *458
Forest reservations, eastern mtns.....(n) 587
Forest-state roads, $1,000,000 for..... 380
Forestry, Profit in water-wks., Pennichuck Water Co.'s, Nashua, N. H.....*472
Forms, Concrete. See "Concrete."
Forests, Power in national.....(n)1200
Forrest, C. N. Asphalt tests.....205, 416
Fort Wayne, Ind.—Wabash grade elimination, *241, 277, Asphaltic-concrete paving..... 993
Fouhy, J. F. Snatching wagons out of pits...*124
Foulds, R. S. Que. bridge accident.....857, *1191

FOUNDATIONS
See also "Piles," "Coffer-dam," "Bridges," etc.
—Albany sewage pump house and grit chamber; caisson sinking. Vernon.....*738
—Armory, Building foundations 150 ft. under Scranton *681
—Bear Lake pumping station, Utah Power & Lt. Co.'s—Largest dredging caisson; piles; concreting, etc.....*98, *172, 178, *408
—Bridge, P. & R., Milton, Penn., *509, *558, (n)*610
—Bridges—Cost of piles vs. increased abutment cost..... 270
—Bklyn. Edison—Hollow piles.....*463, *982
—Bucket, Clamshell, closed by steam engine, Portland, Ore.....*316
—Buffalo G. E. power house—Cylinder-pier foundations laid in sheetpile wells. Boardman *289, Pulling sheetpiles of condensing-water tunnels.....*510
—Canal walls built on old plank foundations, Saving, Union Water Power Co., Me. Sawyer *556
—Charts for eccentric loading on rectangular areas. Cotten.....*1090
—Cleveland filter-plant settlement *1099, Why it is economy to study foundation conditions 1095, Quick repair bids.....1150
—Coke plant near N. Y., Placing foundations for—Koppers plant for Seaboard Byproduct Coke Co.....*688
—Dam, Stopping underground leakage from..*459
—Footing walls, Concrete—Building methods of Johnson & Co., Chi.....*362
—Lehigh Val. terminal, Buffalo, built over drainage channel. Hurlbut.....*436
—Ore dock, Ashland concrete.....*245
—Pump, Drainage, foundation design, is dam problem, New Orleans. Hutson.....*838
—Salamanca bridge—Constructing pile foundation in hard gravel. Steere.....*338
—Soil-pressure test device, U. S. Dept. Ag.. *339, (erratum n) 616
—So. Pac. office-bldg. piledriver.....*509
FOUNDATIONS—Continued
—Tower work, N. Y. Edison transmission line *54
—Underwood Service Bldg., N. Y.—Snatching wagons in two lifts.....*560
—Viaduct bent, Raising settled, Denver.....*221
—Wilmington, N. C., Federal Bldg.—Bottom-driven concrete piles Howell.....*1207
—Winnineg aqueduct cracks from foundation settlement 716
Four-sided areas, Calculating. Averill.....*1186
Frame, Placing steel, in old wall-bearing building *778
France—Baldwin military locomotives *215, Westinghouse motors for southern railways (n) 635
Franchise, Profit-sharing, asked by Minneapolis St. Ry.....1201
Francis, A. C. Restoring flood-wrecked well and pumping system.....*980
Frank, L. G. Activated-sludge air diffusers 107, 267
Frankland, F. H. Bridge floors.....*904
Frazier, R. F., on railway strikes 321, Petition by unorganized railway employees.... 711
Freight. See also "Rates," "Traffic," "Railways."
Freight container, Collapsible steel, Pneu. Scale Corp.'s .....(n) *48
Freight-handler "booster." Astoria pier....*639
Freight, Prompt unloading of, to prevent car shortage..... 511
Freight terminal, N. J., for port of N. Y. *90, 962
Freight yards, Lighting.....*1134
Fried, G. D. Subway work.....*949
Fritz medal presentation.....(n)1057
Fuel-briquet production.....(n) 483
Fuller, G. W. Nitrogen from sewer sludge, 667, 663

G

Galesburg, Ill.—Garbage disposal..... 684
Galveston, Tex.—Causeway progress (n) 333, Concrete arches fabored (n) 1153, (erratum n)1193
Gans, R. C. Sewer-tunnel survey.....*110

GARBAGE AND REFUSE
—Cleveland garbage-tankage yield .....(n)1202
—Dist. of Columbia—Analytical study of garbage, rubbish and ashes—Osborn's report 294, *348
—Gray's Harbor Lumber Co.'s refuse burner of concrete and brick. Blagen.....*588
—Horse or motor for collecting garbage in various cities. Miller.....1006
—Ill. cities, Garbage disposal in two—Danville and Galesburg. Greeley..... 684
—Kansas legislation investigation.....(n) 381
—Los Angeles garbage and rubbish disposal—Pacific Reduction Co.'s Cobwell plant. Simons *677
—N. Y. Cy.—Decarie incinerator, Queens Borough. Woodman *598, 1000, Withington 1000
—Rochester reduction-wks. purchase.....(n) 115
—St. Louis teamster strike.....(n) 141
—San Francisco garbage burial.....1104
—Savannah incinerator costs.....(n) 237

Gas and steam power station, Ford.....1085
Gas, Artificial, statistics, U. S.....(n)1172
Gas calorific-value standard, Second Dist., N. Y. .....(n) 818
Gas case, Buffalo, Unit prices for street mains in. Humphreys..... 316
Gas case, N. Y. St.—Limit set to public review of utilities-comm. orders..... 865
Gas engines. See "Engines."
Gas explosion, Cleveland water tunnel..187, 236
Gas leak finding with lighted match—Kan. church wrecked.....(n)*660
Gas, Natural, conservation.....1144
Gas, Natural embargo, Alberta.....(n) 286
Gas, Oxy-, lead-burning outfit.....(n) 288
Gascoigne, G. B. Activated sludge, Cleveland *1061, *1124
Gasoline. See also "Engines," "Locomotives," "Motor vehicles," "Pumps," "Boats," "Air-compressing."
Gasoline-locomotive exhaust gases.....(n) 767
Gasoline-measuring pump errors.....(n) 860
Gasoline shortage predicted. Hamilton (n) 577
Gasoline supply, Future. Manning.....(n) 839
Gate, "Calco" radial hydraulic.....(n)*1060
Gates, Elephant Butte dam. Teichman....*1915
Gates, Elevator, Paterson-Leitch "Steelite" pressed-steel .....(n)*916
Gates Taintor and Stoney, of Tallassee Power Co. *921
Gaylord, J. M. Cross Cut power station.... 86
Gears, Westinghouse "Bakelite Micarta" noiseless non-metallic.....(n) 532
Gem Lake dam.....*1157
Georgia State Highway Comm.....(n) 479
Georgian Bay Canal. Evans.....*604, 713
Gersoni, L. J. Brooklyn automatic sewage-pumping station.....*810
Gibson, G. H. Montreal centrifugal pump 133
Gideon, A. Charges for use of sewers.....1193
Gilpin, C. D. Handling coal and ore.... 169
Girardot, Colombia, port imports.....(n) 917
Girder. See also "Plate girders."
Girder, Deep concrete, poured in three lifts, Stratford Theater, Phila. Muhlhausen...*506
Girders, Designing concrete fascia.....*1110
Girders, Handling heavy, in demolishing Salamanca bridge. Steere.....*316

Page

Glennan A. H. Govt. and student free engineering service 37
Glenwood Springs pipe roughness..... 896
Godfrey, E. "Unbiased" defined—Flat-slab tests 279, Reinforced-concrete patent decision 668, To mark brown print white 1141, (n)1001
Goethals, G. W. Report 986, 998, 1004, 1005
Gold mining. See "Mining."
Goldbeck's soil-pressure test device *339, (n) 616
Goodman, F. R. Concrete bridge.....*786
Goodwin dump-cars *644
Goose Lake Val. irrigation system, Ore. Heron *503, Rice 809
Gore, W. Venturi meter inaccuracy 514, Water lifts sand to filters from cars.....*803
Government. See also "U. S.," "Interstate Commerce Comm.," "Laws," "War," etc. Government and student free engineering service. See "Competition," "Engineers."
Grade checks at railroad street crossings, Los Angeles..... 462
Grade-crossing dangers are for the foolhardy —P. R.R. experience..... 854

GRADE-CROSSING ELIMINATION
—Chi. & N. W., Clinton, Ia.....*102
—Cleveland—Nickel plate depression....(n)*1042
—Detroit grade-crossing work.....(n) 429
—Huntington Beach, Calif.....(n)*176
—Memphis bridge terminals, St. L. & S. F. work at. Weatherford.....*160
—Rock I.—Slab-deck concrete bridge over highway *1002, Locomotive crane, Chi. *1172
—Wabash, in Ft. Wayne.....*241, 277

Grade-crossing signal. See "Signal."
Grade crossings, Safe—Calif. R.R. Comm..*1185
Grade templet, Adjustable. Teddy.....(n)1092
Grading, Heavy, on 50-mile Southern relocation *1075
Graham J. H. Pneumatic concreting.....*386
Grain separators, Explosions in..... 563
Grand Canyon, Surveying dam sites in *306, (erratum n) 371
Grand Val. Project—Roller-crest dam. Teichman *1, Ed. *60, Large metal flumes *127, Ford motor operating cost.....(n) 176
Grandstand roof, Cantilever, with tension in posts, Salt Lake Cy.....*707
Granite Block pavement, residential street, Bedford Ave., Brooklyn.....*491
Graphite-babbitt bearings, Jeffrey.....(n) 820
Gravel and sand plant, Rose.....*470
Gravel bridge-floor covers must be carefully spread, Minn. roads 330, Why use them? C. E. V. 468, Longshore 616, Nagel 712, Frankland *904
Gravel cart made of scrap, Christman's. Lothrop .....(n) *80
Gravel heater and dryer, Littleford Bros.' "Mullen" .....(n)*144
Gravel layer, Tractor and plows dig out. Bullard .....(n)1041
Gravel roads, Mich. Rogers..... 392
Gray's Harbor Lumber Co.'s refuse burner..*588
Great Atl. & Pac. Tea Co.'s ice factory, Tearing down. Hoadley.....*729
Great Bend, Kan.—Cleaning outfall sewer of quicksand .....(n) 464
Greeley, S. A. Garbage disposal, Ill. cities 684
Green, F. W. No residence restrictions..... 565
Gregg, T. D. Field-artillery service.....*564
Gregory, W. B. Pump tests..... 180
Grit chamber, Building Albany. Vernon....*738
Grounding cone, Hickey & Schneider's "Burn-Boston" carbon.....(n) 964
Grout, Lining wells with cast iron and cement, Tunbridge Wells, Eng.....*150
Grouting Milwaukee Shore tunnel with pumps. Warren *702
Grouting tunnel in Brooklyn end of Catskill Aqueduct. Myers.....*196
Grunsky, C. E. Pump test.....*8, 180
Guard-rail holder for frogs and curves, Mitchell's "Betts" .....(n)*1248
Gypsum and its effect on embedded steel. Marani *229
Gypsum roof slabs, 10-ft. span.....*1173

H

Halley, G. H. Night-work cost 654, Construction reports *994
Hair pumping, Wilder-Manning tannery (n) 610
Haley, A. E. Waterwheel for irrigation....*409
Hammer, Pile formula modified for double-acting steam 29, Knowles..... 417
Hammond, G. T. Activated sludge..... 107
Hammond, L. M. Depth-flow diagrams *802. Strawberry tunnel surveying *1086, Flume-design curve .....(n)*1142
Handle for carrying duct tile.....(n) 80
Harahan bridge. See "Memphis."

HARBORS
See also "Wharves and docks," "U. S. River and Harbor bill."
—Calumet Harbor, Chi., development....(n) 382
—Los Angeles river diversion.....(n) 578
—N. J. freight terminal, Bayonne, for port of N. Y.....*90, 962
—New York's harbor troubles..... 386
—Panama Canal breakwater concrete blocks.1004
—Port Authorities meet, Montreal.....623
—St. Paul harbor changes..... 332

Hardaway Contracting Co. plant.....*922

Hardening—A. S. T. M. papers—Hardness changes, Howe, Levy; water-quenched steel axle equal to oil-quenched, Young..... 88
Hardesty, W. P. Portland survey.....*55
Harding, C. F. Marketing engineering ability 862
Hardman, R. C. Concrete building balanced on middle line of columns.....*1166
Harper, J. L. To save Horseshoe Fall....*1135
Harrisburg bridge, Cumberland Val. R.R. Straightening bent I-beams of second half *385 Building it.....*764
Harrisburg bridge, P. & R. Ry.—Capping piers *703
Harshman, C. C. Obsolescence in appraisals for rate making.....842, 854
Hart convertible dump-cars.....*644
Hartford, Conn.—Water case. C. M. Saville 246, Rainfall data. T. Saville.....*1208
Hasbrouck, O. L. I. concrete roads..... 713
Haskell & Barker dump-cars.....*641
Hasse, C. E. Retaining wall.....*173
Haswell, J. R. Soil tests.....*211
Hatton, T. C. Activated sludge.....107, *688
Haulage. See also "Motor vehicles," etc.
Haulage—Cable system handles dump wagons. Owen *272
Hawaii—Honolulu imprvts.....(n) 761
Hayden, A. G. Plate-girder cantilever bridge, Salamanca, N. Y. *266, Canal-bridge floor. Syracuse *545
Haynes, A. M. Measuring railway curves, 86, Patents and war..... 1239
Hazen, A. Twin-pipe problem 85, Venturi meter inaccuracy.....293, 514
Headgates and bridge, Montreal aqueduct combined 427
Health Board reorganization, Minn.....1153

HEATING AND VENTILATION
—Tunnel ventilation, B. & O.....(n) 261

Helmets, Beer keg and kitchen boiler as diving *607
Henderson, H. Right and left bank..... 856
Hendrick, C. W. Activated sludge..... 106
Hendricks, V. K. Organization of engineering dept. of a railway..... 989
Henry, A. J. Southern rains.....*886, 1001
Hermosa Beach, Calif.—Activated-sludge plant 380, Brosius.....*890
Heron, K. A. Goose Lake Val. irrigation system *503, 809
Herrold, G. H. Miss. Riv. plays with pipe-laying job.....*1028
Herschel, C. Ohio conservancy act.....1190
Herschel, W. H. Water brake..... 378
Hess, H. Should technical societies influence legislation? 278
Hetch-Hetchy dam site *137
Hewitt, A. C. Potash as cement-mill by-product *1222
Hicks, H. L. Drilling anchor-bolt hole *54
Higgins, C. H. Plant appraisal.....*600
Highways. See "Roads," "Streets," "Pavements," "Bridges," geographical names, etc.
Hill Annex mine track shifter.....*1086
Hill, G. E. Wayne sewage works.....*1163
Hinckley, G. C. Condition of iron in Keokuk bridge *400
Hinds, J. Curves for irrigation ditch velocity and discharge *369, Flume outlets.....*1097
Hirschberg, C. A. Roughening concrete.....*755
Hoadley, A. G. Tearing down concrete ice factory *729
Hodges, P. V. Velocity coefficients for dredged drainage canal *1052
Hoff, E. J. Water-level recorder.....*974, *1080
Hohl, L. L. Asphalt-pavement patents..... 761
Hoist. See also "Elevator," "Conveyor," "Derrick," etc.
Hoist, New model of Ingersoll-Rand "Little Tugger" .....(n)*724
Hoist, Automatic-skip ore.....*590
Hoist, Power, for hand guy derricks, Domestic E. & P. Co's.....(n)*432
Hoist, Shepard monorail traveling.....(n)*676
Hoisting details, Que. suspended-span. Meyers *420, Traveler cranes.....*302
Hoisting equipment, Italian freighter.....*210
Hoisting methods, Quebec bridge suspended span *304, *522
Hoisting—Safe loads on rope slings. Salmon.*1183
Hoisting—Snatching wagons in two lifts....*560
Holden, C. A. Engineering education..... 873
Holden, W. Traffic census, St. Louis.....*832
Holland, C. M. East Riv. tunnel surveys....*655
Holland, Paved wheelways in, Spaander *714, Draining North Holland after Jan. flood. Spaander *773
Holmes Safety Asso. and award (ns) 722, 1009
Honey, F. R. Rectifying catenary.....*256, 1046
Honolulu—Public imprvts.....(n) 761
Horner, W. W. Materials chuted through drill holes *705
Horse, Mason's. Travelers Ins. Co.....(n)*176
Horseshoe Fall, To Save. Harper.....*1135
Horton, R. E. Brakes for hyd. turbines 181, Old brick intake tunnel shows low Kutter factor *460
Houston, Tex.—Activated sludge 109, Survey monuments .....(n)*364
Howard, J. E. Elastic limit.....41, 89
Howe, J. M. Land surveying, Tex.....*753
Howe truss highway bridge with composite chord, Utah 559
Howell, C. S. Concrete piles.....*1207
Hubbard, P. Finding spec. grav. of concrete aggregates 136

Huckaby, M. C. La. highways.....*544
Hudson Bay Ry.....(n) 914
Hufeland, O. N. Y. rainfall.....*393, *456
Huff, N. L. Copper-sulphate treatment, St. Paul water-supply 104
Human factor in industry—Human Engineering Congress address. Newell..... 936
Humphreys, A. C. Buffalo gas case..... 516
Huntington Beach, Calif. — Grade-crossing elimination .....(n)*176
Huntington, W. V.—High school.....*763
Huribut, C. C. Railway terminal over drainage channel *436
Hutchinson, C. T., Secy. Engineering Foundation .....(n) 622
Hutson, H. L. Drainage-pump foundations.*838
Hydrant and valve chambers, Concrete, Salt Lake Cy. *66
Hydraulic Sand and Transit Co.'s dredge..*1211

HYDRAULICS
See also "Water" topics, "Pipe," "Pumps."
—Detroit old brick intake tunnel shows low Kutter factor. Maury, Horton.....*460
—Ditch depth-flow diagrams. Hammond...*802
—Flume intakes and outlets, Hydraulic principles of. Norton *541, Hinds *1097, Computing the hydraulic jump. Kennison. 1096
—Flumes, Curve for design of semi-circular. Hammond .....(n)*1142
—Flumes, Rectangular wooden. Stevens...*1160
—Irrigation-ditch velocity and discharge curves. Douglass *72, Hinds.....*369
—Levee fill, St. John dist., Mo.....*158
—Mass diagram. Butcher.....*376
—Pipe, Roughness of steel, after 22 years' service, Glenwood Springs, Colo.; Kutter's formula coefficient. Reynolds..... 896
—Press, 1,000-ton, for briquetting metal waste, (n)*628
—Ram, Siphon-operated, of long standing, in Conn. Palmer *164
—Reservoir mouthpiece expts., Univ. of Penn. Pardoe *520
—Slide rule, Hydraulic, Twin-pipe problem solved by. Hazen..... 85
—Submerged orifices and tubes, Experiments with. Rogers, Smith.....*886, *825
—Velocity coefficients for dredged drainage canal, Blitzen, Ore. Hodges.....*1052
—Water flow increases with rising temperature. Butcher.....*326, 611
—Sand lifted to filters by water.....*803
—Venturi meters inaccurate on lively lines 293, Ledoux, Gore..... 514
—Weir formulas, Deriving. Running.....*695
—Wells, Flow into. Werenskiold.....*256

Hydro-electric. See "Water power."
Hydrolytic sewage tanks, Luton, Eng. Tomlinson *193, 225, Roechling..... 809

I

I-beams of Harrisburg bridge bent by flood, Straightening *385, *764
Ice, Artificial, competes with natural, St. Paul ..... (n) 73
Ice factory, Tearing down old concrete. Hoadley *729
Idaho irrigation-water duty. Bark..... 19

ILLINOIS
—Activated-sludge expts., Univ. of Ill. Bartow, Mohlman, Schneilbach.....*972, 110
—Bridge steel must be inspected before shop coat is applied.....(n)1091
—Civil-service exams. for Junior Highway Engineer without leaving home.....(n)1200
—Engineer Corps, Ill., on Mex. border.....1035
—Highway Dept. Bridge Bureau—Bond and shear in reinforced footing offsets. Older, *18, (errata n) 325
—Highways, Alignment and drainage of. Bilger *874, 901
—Road-direction sign, Prize.....(n)*1092
—Road specifications 127
—Roads, Labor scarcity for.....(n) 577
—Roads, Vermilion Co.—Catchbasins and culverts *209, Planning and organizing for paving *248

Illinois Central. See "Railways"
Imhoff tank. See also "Sewers."
Imhoff tank, Cook Co., Ill *296
Imhoff tank foams, Balto. Potts.....*469
Imhoff tank, Dr. Travis and the 225, Roechling 809
Imhoff-tank patents. Miller.....1239
Imhoff tanks and sprinkling filters, Cleburne, Tex. McDonnell *1028
Imitation, Exact, infringes trade rights—Expansion-bolt case 106
Impact machine, Annapolis.....*283
Imperial Brass Co. building, etc. 885, 954, 1043, 1193
Imperial Valley irrigation—Cerro Prieto Canal 233, Flooding earth roads 297, Colo. Riv. diversion dam 622, Canal-work costs....(n) 333
Improvements, Assessing. Cupper..... 975
Incinerator. See "Garbage and refuse."
Inclines, Cable, Sao Paulo Ry.....*976
India, Activated sludge in.....(n) 624
Indiana—New railway for Penn. system....*1132
Indiana Real Estate Asso.—City-planning campaign .....(n) 770
Indianapolis, Ind.—No bidders on city contracts 1044, Typhoid..... 562
Indianapolis & Frankfort R.R.....*1132

Page

Industrial Conference Board, National....(n)1049
Industrial preparedness. See "War."
Infantile paralysis, What can engineers do to stop? 322
Ingersoll-Rand condensing plants.....(n) 48
Injector, Air-lift, Chicago "Baker".....(n)*384
Injunctions in labor suits—Mass. limitations invalid 297

INSTRUMENTS
See also "Surveys," "Water measurement," "Test."
—CO_2 indicator, Bacharach pocket.....(n)*916
—Pyrometer, Gibb Co.'s "Irite".....(n) 288
—Range finder and clinometer, Young's....*1183
—Slide rule, Bock's water-meter.....*800

Insulating material, Diamond State Fiber Co.'s "Condensate-Cellulac" .....(n)1156
Insulating paint, Union Insul. Co.'s.....(n) 868
Insull, S Growth of elec.-lighting industry.*1045
Insuluminum fittings .....(n) 288
Interest rate in loan repayment (n) 852, Eberly .....(n)1042
International Correspondence Schools' anniversary .....(n) 722
International Geological Congress.....*758
International Joint Comm.....(n)1202
International Nickel Co.....(n) 381
Interstate bridge paving.....*559
Interstate Commerce Comm.—N. J. rate case 129, 324, 415, Rail break, Western Md. 366, (n) 332, First complete railway-valuation reports filed 892, (erratum n) 1001, Engineer exam. ratings (n) 286, So. Ry. loco.-axle break report.....(n) 913
Inventory discussed by A. I. E. E..... 962
Inventories and histories. Low..... 181
Inverted siphon. See "Siphon."
Iowa sec., Am. W.-W. Asso. 791, 1017, (ns) 383, 675, 769, 1091
Iron, Changing from alum to, at Clarksburg filters 927
Iron-removal plant, Brookline.....*448

IRON AND STEEL
See also "Testing," "Rail."
—A. S. T. M. paper abstracts, etc.—Hardness changes in hardening, Howe and Levy; water-quenched steel axle equal to oil-quenched, Young; dangerous ferrite growth in low-carbon boiler tubes, White and Wood; proportional limit identical with elastic limit, Howard 88, Device for comparing tension and traverse tests of cast iron, Morse.....(n) 286
—A. S. T. M. specifications..... 40
—Bridge steel, Ill. highways, must be inspected before shop coat is applied..(n)1091
—Chain cables power-forged at Boston Navy Yard. Coburn *1113
—Cost of structural-steel work, Items affecting. Pittman, Danforth.....1169
—Dredge pins, Strong. Young.....(n) 633
—Metropolis bridge-strut tests by Bureau of Standards *49, 81
—Minn. Steel Co.'s plant..... 138
—Norway, New steel works.....(n) 770
—Paving, Sheet steel, Charlotte.....*946
—Rail corrugation. Pratt..... 217
—Rail price raised.....(n)1010
—Rail break after 10 years.....366, (n) 332
—Rail transverse-fissure cure.....332, 365
—Steel production and business prosperity; Schwab's views 1237
—Structural-steel companies combine....(n) 93

IRON AND STEEL CORROSION
—Anti-corrosion fittings, Insuluminum..(n) 288
—Anti-corrosion iron, Pacific Fdy. Co.'s "Corrosiron" .....(n) 336
—Bichloride of mercury, effect.....(n) 616
—Boiler tubes, Dangerous ferrite growth in low-carbon, Detroit Edison Co. White, Wood 88
—Bridge, Condition of iron in old Keokuk. Hinckley *400
—Bridge corrosion near footwalk, by dogs..*704
—Electrolysis discussion, Am. Water-Wks. Asso. 33
—Gypsum and its effect on embedded steel. Marani *229
—Manganese, Effect. Hadfield, Newton..(n) 352
—Paint, Union Insulating Co.'s.....(n) 868
—Panama locks, Corrosion of submerged metal—Electrolysis, etc. 1005
—Pipe-corrosion resistance test with aërated water. Speller .....(n) 639
—Rails and fastenings, Oiling, to prevent corrosion *847
—Reinforced concrete cracked by salt water, Philippines 1047
—Water-wks. service pipes—Report..... 594

Iron-ore production, U. S.....(n) 785
Iron-ore royalties, Minn. State.....(n)1113

IRRIGATION
See also "Drainage."
—Census statistics—Slow utilization of irrigation works. Teele.....*202
—Ditch depth-flow diagrams. Hammond....*802
—Ditch velocity and discharge, Curves for. Douglass *72, Hinds.....*369
—Duck Val. Project survey.....*490, 905
—Elephant Butte dam, Rio Grande Project (n) 685, Outlet control. Teichman.....*1015
—Field laboratory, U. S., Denver.....*1080
—Fish screens for ditches.....(n) 448

Page

IRRIGATION—Continued
—Flume, Measuring, Dept. Ag.....*270
—Flumes, Curve for design of semi-circular. Hammond .....(n)*1142
—Flumes, Rectangular wooden. Stevens...*1160
—Goose Lake Val. irrigation system, Ore. Heron *503, Rice..... 809
—Grand Val. Project, Colo.—Large roller-crest dam. Teichman *1, Ed. *60, Large metal flumes *127, Ford auto. operating cost .....(n) 176
—Idaho conditions, Duty of water under. Bark, of U. S. Dept. Ag..... 19
—Imperial Val.—Cerro Prieta canal 233, Earth-road maintenance in irrigated lands. Perry 297, Colo. River diversion dam 622, Canal-work costs.....(n) 333
—Kittitas Project, Wash..... 962
—Natomis Co.'s Pritchard Lake pumping station, Calif., for drainage and irrigation.*556
—New Zealand dry farming, etc.....(n) 297
—Oregon State Engineer's river survey guides water adjudicators. Cupper..... 5
—Reeves County system, Tex.....(n) 195
—Salt River Project—Cross Cut power station. Gaylord 86, Mowing-machine work, (n) 364
—Sewage disposal by broad irrigation, San Antonio. Bartlett *586
—Strawberry tunnel surveying. Hammond.*1086
—U. S. Reclamation Service report.....(n)1106
—Water-level recorder. Hoff.....*974, *1080
—Waterwheel, Light home-made, Philippines. Haley *409
—Weir, New standard, U. S. Dept. Ag. Cone.*222

Islands, To plant ocean.....(n) 818
Isometric drawing form, Two Rivers.....(n)*676
Italian freight steamer "Milazzo," Cargo-handling equipment on.....*210

J

Jack, Baird pneumatic lifting.....(n) *48
Jacking concrete-slab bridge.....*900
Jacking poles out; Templeton, Kenly & Co.'s "Simplex" jack .....(n)*708
Jacking Quebec suspended span *421, *424, *522
Jacking up Riverside Drive viaduct, N. Y. Cy.*869
Jacksonville, Fla.—Union station.....(n) 429
Jacksonville, Fla.—Municipal docks..... 722
Jamaica uses "sausages" for river protection. Park 468
Japanese railways, Widening.....(n) 505
Jensen, J. N. Concrete roof.....*372
Jersey Cy., N. J.—Munitions explosion *236, 275
Johnson & Co.'s concrete footing-wall building methods *362
Johnson, H. D. Concrete road pavements on sandy soils.....616, 712, 713, 1036
Johnson, H. T. Combination of plane table and transit for topography.....*488, 905
Johnson, T. H. Sioux Cy. concrete paving.. 830
Joint for water mains, Why not a better? 951, N. E. W.-W. Asso. reports, etc. 570, 958, 960
Joint adhesion—Shrinkage cracks.....(n)*1235
Joints in timber framing, New tests of bolted and lagscrewed, at Panama-Pac. Expo. Dewell.....*111, *162, *796
Jones Fallsway, Baltimore.....*736
Journal, How the engineer should use the technical. Fleming 862
Juror, Engineer as a. Fleming 967, Owen...1098

K

Kadel, B. C. Evaporation studies.....*200

KANSAS
—Bridge contracts—Fair competition required 201
—Flood Congress comm. report.....(n) 530
—Garbage-law study .....(n) 381
—Road maintenance by contract. Moone.. 204
—Sewage works, Experience in running small. Veatch 64

Kansas Municipalities, League of..... 816
Kansas Cy., Kan.—Terminal railway gets 200-year franchise 814, Kaw Riv. bridge plans, Osage Ave. .....(n) 429
Kansas Cy, Mo.—Temporary trestle to complete bridge 529, New municipal bridges 576, Water main, Concrete (n) 578, Slides in deep street cut.....1171
Kan. Cy. Rys.—Cleaning old ballast.....(n)1236
Keast, S. A. Que rocker stresses..... 760
Kendall, F. C. Replacing scour valve.....*173
Kennison, K. R. Hydraulic jump.....1096
Kensico dam quarries. Smith.....*250
Kentucky road contractors wanted. Wiley.. 616
Keokuk bridge, Condition of iron in old. Hinckley *400
Kilbourne & Jacobs dump-cars.....*583
King, C. L., on residence requirements for engineers 413, 565
King, W E. Ashland ore dock.....*242
Kingsbury's twin-pipe problem. Hazen..... 85
Kingston-on-Thames, Eng.—Municipal alum mfr. 261
Kirchhoff, C. W. H., Death of.....(n)*191
Kirchoffer, W. G. Estimating sewer cost..*780
Kittitas irrigation project..... 962
Kitts, J. A. Measuring ry. curves..... 324
Klondike, Excavator in. Young..... *74
Knife, Special, for cutting clay tunnel face, Cleveland *360
Knight, G. L. Hollow piles.....*982
Knollman, E. P. Concrete-arch bridge near Columbus *1109

Page

Knowles, A. M. Pile formula for double-acting hammer 417
Koehring excavator and loader.....*495
Koppers coke plant, St. Paul, Street elevation for 477, Foundation for Seaboard Co.'s plant *688
Kutter's formula questions. See "Hydraulics."
Kyle, G. A., to build Chinese railways.....*814

L

LaRoche, A. L. Binghamton, N. Y., intercepting sewer *1227

LABOR
—Chicago—Grading Columbus Park by day labor *966
—Eight-hour day, Railway 413, (n) 94, Public interest paramount in railway strikes 321, Raising trainmen's wages by act of Congress 465, Petition by unorganized railway employees. Frazier..... 714
—Ill. roads and labor scarcity.....(n) 577
—Injunction limitation invalid, Mass..... 297
—Night and day work cost compared; Michel on Ches. & O. Nor. experience, etc. 323, Whitney 506, Shaw 606, Hailey 654, McDonald 798
—Post-bellum influx unlikely..... 563
—St. Louis garbage collectors' strike....(n) 141
—Strikes on public utilities, Towne's plan to prevent 757
—Unemployed, Experiences with, on road rock breaking, Los Angeles. Martin.... 755
Laboratory explosion, Univ. Ill.....(n) 320
Lagscrewed joint tests. Dewell.....*162, 796
Lake Toxaway earth dam fails..... 331
Lake View oil storage.....*1066
Lakes to seaboard, Traffic routes. Evans *604, Are boats for lake and ocean practicable? Coutlee 713
Lakewood, O.—Sewage works and outfall...*793
Lamp fixtures, Cent. Elec. self-aligning...(n) 964
Lamp, Hirsch portable elec. inspection....(n) 192
Lamp, Milburn 3,000-cp. acetylene.....(n)*480
Lamp posts, Traffic-signal, St. Louis.....(n)*224
Lamp sales, Incandescent elec.....(n) 307
Lamps, Lux "Daylight" elec.....(n) 432
Land reclamation. See "Irrigation," "Drainage," "Rivers."
Lane's daily cost records.....*897
Lasier, E. L. Strength of clamp splices in reinforcement 13
Lath, Composite, of wire cloth and clay..(n)*62
Lavis, F. "Reforming railway curves"..... 46
Lawrence, Kan.—Water-wks. impvts.....(n) 4
Lawrence, S. E. Lubrication system.....*31

LAWS, LEGAL DECISIONS, ETC.
See also "Patents," "U. S.," "Contracts," "Boiler," "Floods, Ohio," etc.
—Barrel law, Standard lime.....(n) 696
—Boston engineers' reinstatement 35, 45, (ns) 94, 333
—Cleveland Building Code—Plumbing..... 328
—Florida state highway law..... 259
—Garbage-laws investigation, Kan.....(n) 381
—Highway legislation, State, and engineering work 1143
—Imitation, Exact, Infringes trade rights—Expansion-bolt case, N. Y.....106
—Juror, Engineer as. Fleming 967, Owen...1098
—Kan. bridge contracts, Fair competition required in 201
—Legislation, Local sections influencing.... 806
—Legislation, Should engineers try to influence?; paper by Hess, in Phila., on A. S. M. E. boiler code, etc. Q. E. D..... 278
—Levee system, Miss., Supporting. Dabney 228
—License law, Tex. engineers discuss..... 864
—Long Sault Rapids, N. Y. recovers....(n)1200
—Los Angeles power-line suits ended.....1200
—License laws, Local. Green 565, Ed..... 413
—Macadam is pavement in Penn.....(n)1023
—Mass.—Lien law revised 253, Labor-injunction limitation 297
—Minn. Surveyors' and Engineers' Soc. to seek improved legislation.....(n) 279
—Municipal ownership of Denver water-wks., (n) 333
—N. J. roads 187, 226, 323, 997, Proposed motor-truck rules 1054, Curbing city and county debts 613
—N. Y. St.—Gas case—Limit set to court review of utilities comm. orders 865, Motor-truck road problem.....1007
—Ohio city tax-limit and sinking-fund laws. 75
—Oregon State Engineer's river survey guides water adjudicators. Cupper.....
—Penn. not liable for state highway accidents ..... (n) 690
—Penn. State highway maintenance cannot be forced .....(n) 939
—Postal-rates bill, Second-class.....1187
—Railway construction, State cannot compel—Santa Fe case, Calif.....(n) 985
—Time-penalty clause, Inaccurate estimate vitiates 53
—Tunnel act void, Pittsburgh.....(n) 45
—Typhoid from water, accident..... 442
—Water case, Hartford—Compensation in kind. Saville 246
—Water-power legislation, U. S. 367, 999, (ns) 190, 430
—Water rights of power plants at Seneca Falls moved for Barge Canal.....*145

Lead-burning outfit, Oxygas, Safety Car Heating and Lighting Co.'s.....(n) 288
Lead-drilling beetle .....(n)1196
Lead water-wks. service pipes..... 594

Page

Ledoux, J. W. Venturi meter inaccuracy.. 514
Leffingwell, F. D. Preventing tunnel blow-outs .....•728
Legal. See "Laws," "Patents."
Letters, Five essentials of effective business. Baebenroth 1046
Letters of application for employment, Experience with. Bock 258, Notepaper defended 37, How not to apply..... 275
Levee, Brevoort, Ind.—Improvised dragline rig .....•1139
Levee const., etc., Little Riv. dist. •76, •342, •740
Levee system, Supporting Miss Dabney..... 228
Levees—Concrete-revetment machine •1070, 1094
Levees—Five days on Mississippi. Wight...•1114
Levees, Hydraulic fill and wheeled scrapers for Miss. Riv., St. John dist., Mo.....•158
Levees—Mo. River mattress.....•1022
Levees of rock-filled wire-mesh bags, Santa Ana River •79, Used in Jamaica, etc. Park 468
Level rod, Impvd. precise, of Coast & Geod. Survey. Fischer .....•895
Leveling, Bubble-reading mirror source of error in. Bevier .....•1037
Leveling methods, Precise, Peters', of Coast & Geod. Survey—Mounting tripod on railway car. Bowie •74, Precise-leveling record .....(n) 1041, 1159
Levers, Raising bridge by. Penney.....•1088
Lewis, J. M. Booster pumping station..... 1017
Lewis, R. A. Computing paving outside curved curbing .....•463
Lewis, W. S. Testing cloth.....•135
Lewiston, Me.—Pumping by water power.....•441
Lexington, Ky.—U. S. Pub. Health Service as consulting engineers on sewer. Glennan 37, Norcross 180
Liberty Statue, Flood lighting.....(n) 1057
Library, Million dollars for United Eng. Soc..1009
License law, Tex. engineers discuss..... 864
Licenses, Local, for engineers 413, Green... 565
Lien law, Mass., revised..... 253
Light. See also "Electricity."
Light exclusion, Plate-girder.....(n) 863
Light, Milburn 3,000-cp. acetylene, for night construction .....(n)•480
Lighting fixture, Cent. Elec. self-aligning..(n)964
Lighting freight yards—Diagrams, etc.—Asso. Ry. Elec. Engineers.....•1134
Lighting, Office and yard. Harrison.....(n) 80
Lighting plant, Cleveland municipal, operating results. Ballard 603
Lima, O.—Sewage disposal.....(n) 46
Lime barrels, Standard-capacity.....(n) 696
Lime, Hydrated, pays at Council Bluffs settling basins. Thornell.....•456
Lime treatment, Cleveland water •732, Slaking tank .....•735
Lindenthal, G. Review of Waddell's "Bridge Engineering" 1174, 1188
Linebaugh, J. J. Elec. braking..... 902
Linseed-oil foots, Measuring. Holley..... 89
Liquid-fuel supply, Future sources of.....1189
Little Riv. drainage dist. work, Mo., •342, •740, Tracks for excavators.....•76
Little Rock, Ark.—Water company need not test wells .....(n) 478
Load-line and bulkhead rules.....(n) 674
Loader, Barbeau & Werring's Albrecht dragline, for roadwork .....•78, (erratum n) 469
Loader, Burch wagon, with belt conveyor.(n)•336
Loader, Home-made horse-operated wagon—St. Morris', of New Mex.....•361
Loader, Jeffrey barrel .....(n)•1108
Loader, Wagon, and excavator, Koehring....•495
Loan repayment, Interest rate in (n) 852, Eberly .....(n)1042
Lochridge, E. E. Intermittent excess coagulant, Springfield, Mass. 617
Lock. Canal. See "Canals."
Lock on Cape Fear Riv., Steel sheetpile cofferdam for 549
Lock, Troy dam, work •408, •492, •533, •609, 613
Locknut for bolts, Boss.....(n)•144
Locknut, O. K. tight-grip .....(n)•1060
Lockwood, F. M. Municipal shops, San Diego .....•548

LOCOMOTIVES
—Coal, Powdered, as fuel .....177, (n) 27
—El Paso & S. W. 1857, locomotive parked..•101
—Elec. locomotives, Chi., M. & St. P. ..... •24
—Flange oiling to save rails 853
—French military locomotives, Baldwin-built.•215
—Gasoline dinkey, Contractors', with friction drive, Fate Co.'s .....•319
—Gasoline exhaust gases in mines.....(n) 767
—Gasoline switching locomotive, Baldwin, for Erie at Chi. .....(n) 384
—Motor-truck as dinkey .....(n)•274

London, Eng.—Street traffic 905, Seatless cars 1128, Activated sludge (n) 37, Deep-water dock .....(n) 286
Long Island concrete roads; surfacings for sandy soils. Johnson 616, Longshore 712, Hasbrouck 713, Contribution 1036, Finishing concrete surface, Quoque-Southampton (n)1092
Long Sault Rapids, N. Y. recovers.....(n)1200
Longport, N. J.—Sea wall.....(n) 382
Longshore, R. L. Standard bridge plans •471, Gravel cover on concrete highway bridges 616, Sand road surfacing..... 712
Lord, A. R. Flat-slab tests 85, 279
Loree, L. F. U. S. the world's reservoir of capital 1093

Page

LOS ANGELES, CALIF., CITY AND COUNTY
—Check dams in mtn. cañons .....(n)1154
—Electricity—Municipal ownership .....(n) 914
—Excess condemnation. Mohler ..... •20
—Garbage and rubbish disposal. Simons....•677
—Grade checks at railroad street crossings.. 462
—May be its own contractor—if..... 912
—Pavement, Concrete, for motor trucks.....•639
—Platform shelters, Unit const. concrete.... •73
—Power-line suits ended.....1200
—River diversion from harbor .....(n) 578
—Road-patching machine .....(n)•412
—Ship line, Municipal, ocean.....(n) 914
—Street tunnel, Another .....(n) 330
—Survey, Geodetic .....(n) 660
—Unemployed, Experiences with, on road rock breaking. Martin 755

Louisiana—Solving highway-imprvt. problems. Huckaby •544, Boiler-code adoption...(n) 735
Low, E. Inventories and histories 181
Lower Otay dam. See "Dams—San Diego."
Lübecker excavator in Klondike ..... •74
Lubrication. See also "Oil."
Lubricating oil, Emulsification value of. Conradson, Herschel..... 136
Lubrication of engine cylinders 663, Nordberg 808
Lubrication system, New, for construction machinery, Ohio lock and dam work; Davis lubricator. Lawrence .....•317
Lubricator, Elevator guide-rail, Lyne...(n) 96
Lumber. See "Timber" and cross-references.
Luten bridge-patent decision 577, 661
Luton, Eng.—Hydrolytic sewage tanks. Tomlinson •193, 225, Roechling 809
Lynn, Mass.—Sewage disposal (n) 530, Floating bridge .....(n)1057

M

Macadam. See also "Roads," "Pavements," "Streets."
Macadam cleaner and bitumen spreader, Finley .....(n)•820
Macadam held to be pavement.....(n)1023
Macadam-road maintenance with bituminous binders, N. Y. State. Ripley .....•1018
Macadam roads, Resurfacing, with small brick cubes 827
McClean, G. T. Viaduct vs. fill at Astoria.. 325
McClintock's field-book sheet .....•363
McCullough, E. Field-artillery service should attract engineers 353, •564, Concrete buildings are free from depreciation 954, Cement-milk paint .....(n) 128
McDonald, H. Night and day work..... 798
McDonnell, R. E. Cleburne sewage works..•1028
McEntee, W. Propeller tests.....1173
McGrath, P. J. Welding broken cylinder.... •77
Machine shop. See "Shops."
Machinery, Commonwealth Edison plant, Chi.—Wrecking old by cutting torches •1040, Growth in size, etc. •1045, 45,000-hp. turbine .....•52
Madison-Anson water-supply.....•542
Mafflitt, McK. Sand-clay street surfacing from sewer trenches .....•752
Magnolia cutoff winter concreting.....•269
Mail-rates bill, Second-class.....1187
Maine—Madison-Anson water-supply .....•542
Malone, N. Y.—Supply main sustains capacity for 28 years..... 461
Manganese-bronze bolt breakage, Panama; Catskill Aq. experience 998, Miller.....1147
Manganese, Effect of, on steel corrosion. Hadfield, Newton.....(n) 352
Manhole pump, Rochester elec. .....(n)•176
Manhole steel-step cost reduction, Pueblo.(n) 224
Manholes built in quicksand with open caisson 30
Manitowoc hydraulic dredge.....•1211
"Manograph" differential pressure gage..(n) 96
Marani, V. G. Gypsum, effect on embedded steel .....•229
Marketing engineering ability. Harding 862
Markham, E. M. Concrete-revetment machine for Miss. .....•1070, 1094
Marseilles Canal tunnel .....•1013
Marshall, Ill.—Pavements Paige....•978, •1218
Martin, N. R. Experiences with unemployed on road rock breaking 755
Mass diagram for power and water-supply. Butcher .....•376

MASSACHUSETTS
—City boards of survey..... 189
—Labor-injunction limitation invalid..... 297
—Lien law revised..... 253
—Pavements, Slipperiness test.....1162
—Paving, Rough-surface asphalt.....•1141
—Railway rolling-stock life.....(n) 831
—Water-Wks., Met.—Air chamber protects venturi meter from pulsations. Doane.•1184
—Water-Wks., Met.—Bellevue tank.....•434
—Waterways and Public Lands Comm...(n) 237

Master Car Bldrs. Asso. on wheel flanges and frog clearances..... 34
Mat, Flexible, for concrete form.....•992
Matawan, N. J. Activated sludge.....(n) 140
Materials an active field..... 33
Materials, Facts about. See "Testing."
Mattress, Brush, must it go? 1094, Concrete-revetment machine. Markham.....•1070
Mattress, Brush, stone and wire-mesh used by Wabash Ry. for Mo. Riv. bank protection. Everham .....•1022
Mattress work, Dutch dikes.....•775

Page

Mattresses, Board, for revetment.....(n)660
Mattresses, Brush, on Miss. Wight.....•1114
Maury, D. H. Old brick intake tunnel shows low Kutter factor •460, Fire rates..... 901
Maxwell, W. H. Lining wells.....•150
Mayer, J. Que. bridge work..... 517
Medal, Dexter Brackett.....•478
Melber concrete-patent decision.....661, 668
Melbourne municipal lighting plant.....(n)1131
Memphis, Tenn.—Grade-crossing elimination at Harahan bridge terminals. Weathersford •160, Bridge opened (n) 189, Municipal operation of private lighting plants proposed .....(ns) 866, 1202
Mercury bichloride, effect on pipe or concrete, (n) 616
Merit, C. S. Passing examinations.....1001
Metal-waste briquetting press.....(n)•628
Meter station, Westinghouse outdoor, for high-tension elec. lines.....(n) 628
Meter, Water. See "Water measurement."
Metropolis, Ill., bridge •151, (n) 1154, Strut tests •49, 81, Erecting and swinging 720-ft. span .....•1198
Mexican border, Ill. Engineer Corps on.....1035
Meyers, A. J. Que. bridge work •298, •420, •522
Meyers, E. L. Concrete paving, Dallas..... 706
Miami conservancy. See "Floods."
Michel, W. Night-work cost..... 323

MICHIGAN
—Bridge abutment, Concrete, wrecked by backfill. Thomas .....(n)•804
—Bridge failure, Highway. Thomas.....•455
—Bridges, Erecting highway, under traffic. Dewart .....•798
—Bridges, Standard pony-truss. Dewart...•990
—Ohio boundary survey, Retracing.....•1234
—Pavement, Resurfacing concrete, with reinforced concrete 690
—Pavement, Concrete, joints omitted. Thomas 609, 905
—Roads, Canvas belt for resurfacing concrete, •654, 709
—Road aid, Making most of Federal. Thomas 795
—Road construction, Concrete.....•1082
—Roads, Gravel, economical. Rogers..... 392

Middleboro, Ky.—Street-intersection problem.•801
"Milazzo," Cargo handling on.....•210
Military. See "War topics."
Milk-cement-lime paint .....(n) 128
Mill Creek sewer tunnel, St. Louis—Alignment survey. Gans •410, Materials chuted through drill holes to mixer. Horner.....•705
Mill-refuse burner, Gray's Harbor Blagen..•588
Miller, A. E. Trenching machines in war... 791
Miller, B. F., Jr. Garbage collection.....1006
Miller, S. F. Patents in municipal-contract specifications 1239
Miller, S. W. Detecting initial stress in bronze 1147
Milton bridge work, Penn. ..•509, •538, (n)•610
Milton reservoir, Youngstown, O.....•1084

MILWAUKEE, WIS.
—Activated-sludge plant •686, Hatton 107, Mechanical agitation expts..... 856
—Nitrogen from sewer sludge. Copeland 665, Ed. 663, Fuller..... 667
—Sewers, Surveying for intercepting. Townsend •1232, Contractors' compressed-air regulations .....(n)1236
—Tunnel, Shore—Survey routine •657, Grouting with pumps. Warren •702, Concreting methods. Warren •794, Steel-lined material chute (n) •708, Economizing compressed air .....(n)1041

Mine cave-ins, Scranton.....276, •280, •681
Mine subsidences, English salt.....(n)1085
Mine, Copper Queen, Cave from.....(n) 495
Mine, Track shifter for stripping Hill Annex. Rossman .....•1086
Mines, Benson, automatic skip, handles hot ore. Schiefer.....•590
Mines, Cardiff, tractor haulage.....•1140
Mining-drill contest, Calif.....(n) 29
Mining—Excavator in Klondike..... •74
Mining-experiment and safety stations...(n) 446
Mining—Gasoline exhaust gases.....(n) 767

MINNEAPOLIS, MINN.
—Bridge progress, Concrete-arch.....•1201
—Filter-patent suit won.....951, 960
—Pavement expts., Woodblock.....•737
—Paving by day labor.....(n) 913
—Pipe laying across river; flood.....•1038
—Pipe laying with trenching machine....(n)•224
—Street Ry. Co. asks profit-sharing franchise.1201
—Street railways, Value of.....(n) 763

Minnesota Joint Engineering Board.....(n) 578
Minnesota—Concrete highway bridges 222, Bridge-abutment costs 270, Gravel bridge covers 330, 468, 616, 712, •904, Test of new type of concrete bridge •620, Consulting engineering services free (n) 1151, State iron-ore royalties (n) 1113, Health Board reorganization .....(n)1153
Minnesota Surveyors' and Engineers' Soc.—Legislation and ethics.....(n) 279
Minnesota Steel Co.'s plant..... 138
Mirror, Bubble-reading, source of error in leveling. Bevier.....•1037
Misfire, How to handle..... •78
Misfits in engineering, How avoid? Wilson, 388, 414, Buff 565, Ruggles 713, Holden.... 873

Page

Mississippi River. See "Rivers."
Missouri—Road impvt.; engineer's pay limit, 757, (n)1021
Mixer. See "Concrete" (various sub-entries.)
Moffat tunnel financing.....(n) 141
Mohler, C. K. Excess condemnation.....*20
Mohlman, F. W. Activated sludge.....*972
Molitor, F. A. Cable inclines, Sao Paulo Ry..*976
Moment of inertia of lenticular section, Finding. Vetter.....*995
Monorail railway, Suspended, Calif.....(n) 578
Montana—Standard water-rate forms..... 648
Montreal, Que.—Centrifugal pump. Gibson, Burford 133, More data on it. Peterson, 835, Aqueduct combined bridge and headgates, 427, Water company makes its own alum and chlorine 477, Municipal water-power project condemned..1043, *1048, (n)1010
Monument, Sewer-tunnel surface, St. Louis..*410
Monuments, Houston survey. McVea.....(n)*364
Monuments, Ohio-Mich. boundary.....*1234
Moone, E. V. Kan road maintenance by contract 204
Moore, G. H. Population expectancy.....*844
Moore, R. W. Highway legislation.....1143
Moore on fatigue hypothesis..... 136
Moreell, B. Tile sewers, St. Louis.*1024, (n) 660
Morena dam, Plan to raise.....*1112
Morgan Engineering Co.'s experience with applicants 258
Morgantown, W. Va.—Brick pavement broken by motor-truck traffic.....(n)*510
Motor, Knox Co.'s Trego 300-hp. aëro....(n)*1108

MOTOR VEHICLES
—Bridges, Motor-truck loads for highway. Childs *898
—Dump wagon, Converted automobile as—Smith Form-a-Truck Co.'s.....*175
—Electric car, Rail-and-road.....(n) 397
—Engine, White 4-cylinder.....(n)1248
—Fire engines, etc., Elec., Paterson.....(n) 887
—Ford operating cost, Grand Val. Project..(n) 176
—Forest-fire patrol truck.....*473
—Garbage collection, Horse or motor for, in various cities. Miller.....1006
—Passenger-omnibus trailer, Fageol's "Fadgl Flexible" .....(n)*868
—Pittsburgh racetrack proposed.....(n) 674
—Public-comfort stations..... 277
—Road oiler, Cost of operating motor, St. Paul .....(n) 274
—San Diego city auto-running cost.....(n) 809
—Sheridan low-priced commercial motor car, (n)*384
—Statistics, U. S. motor-vehicle.....(n) 245
—Thomas transmission system for motor road train .....(n) 253
—Tractor and trailers, Heavy haulage for, Cardiff mines.....*1140
—Tractor-grader outfits, Utah roads..... *28
—Tractor, Tom Thumb light.....(n)*432
—Truck, Adapting, to its work—Prize-article offer 805, 997, Award.....1237
—Truck and trailer hauls 40 tons per day, Haskins Dolomite Co.....(n)*1236
—Truck and trailers, Dumping, for Philippine road work.....(n)*996
—Truck, Milwaukee small industrial.....(n)*964
—Truck, 3-ton, hauls 26 tons of crushed rock—Four Wheel Drive Auto Co.'s as dinkey on narrow-gage road, Sioux Cy., (n)*274
—Trucks, Concrete pavement for, Los Angeles *639
—Trucks dump at second-floor level.....(n)*1041
—Trucks, Long-distance haulage with, Ariz.. 271
—Trucks ruin impvd. granite-block pavement, W. 42d St., N. Y. *691, 938, Time to stop road destruction 710, Truck sprnigs to save pavements, San Francisco. Claussen 904, Menace to street pavements; truck limit sizes in various places. Stern 938, Cleveland limits loads and speed 719, N. Y. State highway problem, 1007, N. J. highway engineers tackle problem 1054
—White truck gasoline consumption.....(n) 804

Mouthpiece, New knowledge on standard. Pardoe, Univ. of Penn.....*520
Moving power plants, Seneca Falls, for N. Y. Barge Canal.....*145
Mowing by machine at angle of 45 deg. Halton .....(n) 364
Muck-cars, Transfer plate for.....1038
Mudgett, F. G. Raising Spaulding dam.....*328
Muhlhausen, L. Pouring girder *506, Comparative costs of concrete and mill construction 1193
Mullen & Buckley warehouse fire.....*956
Municipal. See also "City," "Wharves and docks," "Electricity," names of cities, etc.
Municipal alum mfr., Kingston-on-Thames, Eng. 261
Municipal auditorium, Phila.....*188
Municipal bridge, St. Louis.....*1129, *1230
Municipal dock, etc., St. Louis.....216, *1216
Municipal-contract specifications, Patents in. Miller 1239
Municipal elec. plant, Wallingford.....(n)1053
Municipal Impvts., Am. Soc.—Asphalt tests. Smith 205, 416, Forrest 209, Convention; papers.....766, 855, 938
Municipal lighting-plant operating results, Cleveland. Ballard 603
Municipal lighting plant, Melbourne.....(n)1131
Municipal operation of private lighting plants, Memphis, proposed.....(ns) 866, 1202

Page

Municipal ownership of Denver water-wks., Legality of.....(n) 333
Municipal ships, Los Angeles.....(n) 914
Municipal shops, San Diego.....*548
Municipal water-power project, Montreal, condemned by engineers...1043, *1048, (n)1010
Municipal week, Springfield, Mass. 1046, 1053, 1054
Myers, O'K. W. Tunnel grouting in Brooklyn end of Catskill Aqueduct.....*196

N

Nagel, C. E. Gravel bridge covers..... 712
Names. See "Nomenclature."
Narrows siphon, Connecting, to Staten Isl. main *782
Nashua, N. H.—Water-wks. forestry.....*472
Nashville, Tenn.—Paving litigation (n) 210, Water-Wks. supt. (n) 238, Water-wks. impvts. .....(n)1202
National Academy of Sciences and Engineering Societies.....(n) 237
National Elec. Light Asso., 30, 633, 816, (ns) 307, 669
National Industrial Conference Board....(n)1019
National Lumber Mfrs.' Asso. 273, Cost of timber and concrete factory buildings, 884, 954, 1043, 1193
National Paving Brick Mfrs.' Asso. 721, (n) 431, Monolithic pavements.....1239
National Research Council..... 729
National Smoke Prevention Asso....673, (n) 287
Natomis Co.'s pumping station.....*556
Natural resources. See "Conservation."
Navy. See "War," "U. S."
Neafie, A. J. Oiling rails.....*847
Neall, F. L. Road and terminal costs....324, 415
Nelles, D. H. Photogrammetry.....*878
New Bancroft Hotel roof.....*372
New England Water Wks. Asso.—Brackett medal *478, Progress 562, Portland meeting, reports, papers, discussion, etc. 570, 594, 617, Water losses 951, 958, 960, Nominations .....(n) 867

NEW JERSEY
—Debts, Curbing city and county..... 613
—Freight terminal, Bayonne, for port of N. Y. *90, 962
—Motor-truck problem, Highway engineers tackle 1054
—N. J. Sanitary Asso.....(n)1156
—Railway-rate case 129, 415, Terminal costs. Neall 324
—Road conditions, Investigating.....187, 226, 323
—Road legislation, Blundering—Bond issue voted 997, Wulff.....1240

New Mexico roads.....*481, 482
New Orleans, La.—Making water consumers pay for sewer service 512, 1193, Drainage-pump foundations *838, Public-utilities board (n) 333, State to vote for bridge or tunnel (ns) 477, 626, Paving and repair work .....(n)1202

NEW YORK CITY
See also "Subways."
—Bridge-approach bldg., Blackwell's Isl..(n) 27
—Bridge inspection, Railway.....(n) 259
—Brooklyn R. T. rail head.....*418
—Building board, New—"Standards and Appeals" 137
—Cave, Stalactite, for museum.....(n) 495
—Coffer-dam, North River piers completed inside of huge..... 45
—Electric rates.....(n) 914
—Elevated rys., Bklyn.—Light-exclusion by plate girders.....(n) 863
—Elevated track inspection by periscope..(n)1186
—Explosion, Munitions, in harbor.....*236, 275
—Freight terminal for port, N. J.....*90, 962
—Harbor troubles..... 366
—Pavement, Granite-block, Bedford Ave., Brooklyn *491
—Pavement, Impvd. granite-block, W. 42d St., ruined by motor trucks, *691, 710, 719, 904, 938, 1007
—Paving methods in Manhattan revised—Engineer Stern's report..... 397
—Refuse incinerator, Queens Borough. Woodman *598, 1000, Withington.....1000
—Riverside Drive viaduct, Jacking up; buckling columns.....*869
—Sewage-disposal plant, Elmhurst, report; electrolytic tests.....91, 370
—Sewage-pumping station, Automatic, Brooklyn. Gersoni.....*810
—Sewage treatment, Brooklyn—Activated sludge. Hammond..... 107
—Sewer design, Long-time rainfall basis for. Hufeland.....*393, *450
—Sewer siphons, Inverted, under subway. Bleich *442
—Street-cleaning report, Fox's..... 227
—Street, World's busiest, 5th Ave. (n) 597, Other cities heavier?.....761, 905
—Tunnel, East Riv., at 60th St., Low bids.... 132
—Tunnel, East Riv., blowout; prevention....*728
—Tunnel, East Riv., surveys. Holland.....*655
—Tunneling machine, App rock.....*340, 365
—Tunnels, East Riv., Progress on—(ns) 963, 1106
—Water-supply (see also "Aqueducts—Catskill)—Water-wks. deficit likely—Williams' Catskill report 367, Chlorinating the supply. Coffin *438, Correcting Croton water-shed area. Brush 576, Wegmann, Vermeule 664, Waterproofing drawings 808, 1037, Rock tunnel 18 mi. long.*1008

Page

NEW YORK CITY—Continued
—Water-wks. relics, Early.....*1243
—Zoning progress, Leads U. S. in 225, Regulations. Ford..... 405

N. Y. Edison transmission-line work..... *54

NEW YORK STATE
—Barge Canal—Power plants and factories moved at Seneca Falls; Canal power plant *145, Canal in partial operation 373, Progress; terminal problem (n) 1057, Shallow railway floor on Erie Canal bascule bridge, Syracuse. Hayden.....*545
—Gas calorific-value standard, 2d Dist...(n) 818
—Long Sault Rapids recovered.....(n)1200
—Military Engineers, 22nd—Camp Whitman water-supply *498, Make good 513, Information .....(n) 190
—Motor-truck highway problem.....1007
—Popolopen steel arch.....*337
—Road-building materials, Cost of testing—Breed's report..... 455
—Road maintenance, Macadam, with bituminous binders. Ripley.....*1018
—Road-maintenance costs in N. Y., What are? Pierce..... 807
—Road policy, State..... 323
—Road-progress report..... 443
—Roads, Resurfacing macadam, with small brick cubes, Monroe Co..... 827
—Storm King road, Building.....*596
—Utilities comm. orders, Limit set to court review of, in gas case..... 865

New Zealand—Dry farming and irrigation, (n) 297, Competition of Govt. engineers, (n) 305
New Zealand Shipping Co.....(n) 585
Newell, F. H. Human factor..... 939
Newell, J. P. Astoria municipal docks.....*697
Niagara—To save Horseshoe Fall. Harper..*1135
Niblack, A. C. Ship canals.....1188
Nickel refinery for Canada.....(n) 381
Nimmo, W. Thin arch dam.....*712
Night and day work cost compared; Michel on Ches. & O. Nor. experience 323, Experience elsewhere. Whitney 506, Shaw 606, Hailey 654, McDonald..... 798
Nitrate plant, Government.....155, 415, (n) 190
Nitrogen from sewer sludge, plain and activated. Copeland 665, Ed. 663, Fuller..... 667
Noble, G. L. Armour sewage plant..... 110
Nolen, J. City-planning problems..... 102

NOMENCLATURE
—Concrete, Meaning of..... 81
—Elastic limit, Meaning of.....41, 89
—Joint committee wanted..... 81
—Retirance—New depreciation term. Barker, 1167, 1212
—Right and left bank of stream..... 856
—Sewerage and disposal—Am. Pub. Health Asso. 858, Phelps..... 955
—Term, Unusual engineering.....(n) 996
—Valuation terms, Standardizing—Am. Elec. Ry. Assoc. report by Young..... 787

Norcross, P. H. Govt. engineering not competition 180
Nordberg engine cylinder lubrication 663, B. V. Nordberg..... 808
Nordell, C. H. Sewage agitation..... 856
Norfolk Naval shop specifications..... 512
Norrman's ruling pen.....*273
Northampton, Mass.—Water consumption reduced .....(n) 203
Northwestern Road Congress—Highway impvt. in N.W. States.....1153
Norton, A. C. Flume intakes and outlets, *541, 1096, *1097
Norway, New steel works.....(n) 770
Notepaper defended..... 37
Notes, Loose-leaf, Ogden surveys.....(n)*320
Nut, Boss lock.....(n)*144
Nut-lock, O. K. tight-grip.....(n)*1060

O

Oak Park, Ill.—Asphaltic-concrete paving.... 788
Obsolescence in appraisals for rate making. Harshman 842, 854
Office, Portable steel.....*585
Ogden, Utah—Survey notes.....(n)*320

OHIO
—Cities, Lessons from—Tax-limit and sinking-fund laws..... 759
—Conservancy; Miami flood prevention *906, (n) 674, Plan approved 1055, 1093, Scioto Riv. widening, Columbus.....1055, 1093
—Conservancy act, The Ohio. Herschel.....1190
—Road-work bids opened.....(n) 186
—State Bldg., S. F., moved across bay.....*381
—Survey completion, Topographical.....(n)1105
—Survey, Retracing old, to settle Mich. boundary dispute *1234

Oil. See also "Lubrication."
Oil conservation 1144
Oil engines. See "Engines."
Oil from Calif gusher, Storing and measuring. Roalfe *1066
Oil in engine cylinders 663, Nordberg.....808
Oil, Influence of viscosity in pumping crude. Collins 22
Oil, Lubricating, Emulsification value of. Conradson, Herschel..... 136
Oil purifier, De La Vergne lubricating....(n) 868

Page

Oil reservation for Navy.....(n)1202
Oil reservoir, Concrete-lined, El Segundo, Calif. *849
Oil-still cylinder repair.....*77
Oil supply, Future sources of.....1189
Oil tanks, Repairing damaged.....(n)*510
Oiling, Locomotive-flange, to save rail wear on curves, N. Y., S. & W.....853
Oiling rails and fastenings to prevent corrosion—D., L. & W. practice. Neafie.....*847
Oiling roads, western N. Y.....*1018
Older, C. Bond and shear in reinforced footing offsets *18, (errata n) 325, Wind cripples bridge.....*638
Olean, N. Y.—Flood prevention.....721
Olson building cost, Chicago, etc. 885, 954, 1043, 1193
Omaha, Neb.—Relining reservoir.....*646
Ontario hydro-elec. power shortage (n) 233, To enlarge system 478, To develop Chippewa Creek.....(n)1056
Ore dock, Ashland. King.....*242
Ore handling, Chile copper. Gilpin.....169
Ore hoist, Automatic-skip. Schiefer.....*590
Oregon Portland Cement Co.'s mill. Findlay.*1194
Oregon—State Engineer's river survey guides water adjudicators. Cupper.....5
Orenstein-Arthur Koppel dump-cars.....*582
Orifices and tubes, Experiments with submerged. Rogers, Smith.....*825
Osborn, I. S. Garbage, etc., study.....294, *318
Osgood, J. O., Death of.....*93
Owen, A. E., chief engineer.....*138
Owen, A. F. Lawyers select juries.....1098
Owen, J. M. Wagon cable system *272, Loose-leaf filing system for surveys.....*346
Owensboro, Ky.—Prorating paving cost. Talbott *14
Oxyacetylene. See "Welding," "Cutting."
Oyster disinfection. Wells.....(n) 285
Oyster shells, Cement from. Struckmann....*230

P

Pacific G. & E. Co.—To raise Spaulding dam.*328
Pacific Light & Power Co.....1200
Pacific Power Corp.'s dams.....*1157
Packing-house sewage test plant, Buenos Aires 837
Packing houses, Chi.—Activated sludge 109, 110, Effect of sewer gas on concrete sewer *486, 511, New and old sewers 487, Bubbly Creek's abolition *725, Refuse disposal; sewerage .....(ns) 427, 1202
Paige, W. R. Monolithic brick paving *978, 1218
Paint, Cement-lime-milk.....(n) 128
Paint gun, Spray Engineering Co.'s comp.-air .....(n)*676
Paint, Union Insulating Co.'s.....(n) 868
Palisades Park—Popolopen viaduct *337, Storm King road.....*596
Palmer, H. S. Old hydraulic ram.....*164
Panama-Pac. See "Exposition."
Paraffin-wax coating for filter tanks and pipes, Toronto.....(n) 464
Pardoe, W. S. Reservoir mouthpiece experiments *520
Paris, Ill.—Pavements.....721
Park, Columbus, Chicago, grading by day labor *966
Park, J. N. Jamaica uses sausages for river protection 468
Parsimony, Fruits of. G. M. B.....84
Passenger-terminal cost. Bikle.....(n)1215

PATENTS
—Asphalt-pavement patents 434, Hohl 761, Richardson 1001
—Bridge-patent decisions, Thacher.....44, 621
—Bridge patent, Luten, called invalid in lower court 577
—Concrete-patent decision, Reinforced, Pittsburgh high school—Melber and Brannon patents, etc. Godfrey.....668
—Concrete-patent situation, signs of clearing in 661
—Concrete-slab floor decisions, Turner...720, 769
—Dock patent upheld, Ferguson-Carey concrete, of Cleveland Dock & Eng. Co.....961
—Filter suit, Minneapolis wins 960, Patenting the unpatentable.....951
—Municipal contract specifications, Patents in; Imhoff tanks. Miller.....1239
—Septic-tank patent, Cameron, ended, 663, (ns) 141, 866
—War, Patents and Haynes.....1239
—Words, Permutit Co.'s patented.....(n) 676

Paterson, N. J.—Elec. fire vehicles.....(n) 887
Patten, W. B. Replanning, Duluth.....*645

PAVEMENTS
See also "Streets," "Roads."
—Am. Soc. Mun. Imprvts. convention—Asphalt, wood-block, bitulithic and brick pavement specifications.....766
—Asphalt, Bituminous-material tests for sheet; A. S. M. I. specifications. Smith, 205, 416, Forrest.....209
—Asphalt-block joints, Sand-spreading device for filling.....(n)*1142
—Asphalt-joint filling machine, San Bernardino Co., Calif. Bright.....*851
—Asphalt-mixing plant, Self-propelling, Municipal Eng. & Con. Co.'s.....(n)*868
—Asphalt pavements, Low-priced, Burlingame, Calif. Wold.....(n)715
—Asphalt-paving history—Penetration macadam 434, Patents. Hohl 761, Richardson 1001

Page

PAVEMENTS—Continued
—Asphalt paving, Rough-surface, Mass., *1141, 1162
—Asphalt specification should be adopted, Standard. Draney 278, Durham.....416
—Asphalt use increasing—Statistics.....*307
—Asphaltic-concrete pavements, Cost analysis of, Albany, Ore. Penland.....103
—Asphaltic-concrete paving, Ft. Wayne, Ind. 993
—Asphaltic-concrete paving, Oak Park, Ill... 788
—Bismarck, N. D., contracts let.....(n) 770
—Bitumens, Richardson's colloidal.....(n)1012
—Boston paving squabbles.....(n) 237
—Boston streets, Pavements recommended... 307
—Brick Mfrs.' Asso., Natl. Paving—Inspects pavements at Terre Haute, Ind., and Paris, Ill.....721, (n) 431
—Brick pavement base, Concrete for (Inq.) W. H. W.....(n) 616
—Brick pavement broken by motor-truck traffic, Morgantown, W. Va.....(n)*510
—Brick pavements. Monolithic. Blair.....1239
—Brick paving, Monolithic, for wide streets, Marshall, Ill.; special expansion joints, etc. Paige *978, Cost records. Paige..*1218
—Brick, Use of vertical-fiber.....(n) 717
—Bridge, Interstate, Portland, Ore.—Roller shapes paving along track.....*559
—Capitol terraces made waterproof.....*629
—Chi. boards' co-operation saves pavement openings 130
—Chi. paving under administration fire—Baker's report 1104
—Cleveland—Durax pavement, Brooklyn-Brighton viaduct.....(n) 127
—Cleveland paving-work boards...(ns) 141, 1009
—Concrete, Canvas belt for finishing, Wayne Co., Mich. *654, 709, Resurfacing concrete pavement with reinforced concrete. 690
—Concrete expansion breaks curbs, Florence, S. C. Maffitt.....(n)*708
—Concrete pavements, Garden-hose finish for, Charlotte, N. C.....*803
—Concrete pavements, Mich. omits joints in. Thomas 609, Wood-block expansion joints in concrete pavements, Wichita, Kan. Brockway 905
—Concrete pavements of world—Maintenance survey by Portland Cement Asso., (n)1154
—Concrete-road construction, Mich.—Royal Oak-Pontiac road—Baker machine for finishing; expansion joints, etc.....*1082
—Concrete road, Easton-Allentown.....(n) 912
—Concrete road pavements on sandy soils, Long Island. Johnson 616, Hasbrouck 713, Types of surfacing for loose-sand foundation. Longshore 712, Contributor.1036
—Concrete road slabs, Creeping and heaving of. Sampson 134, Trego 369, Buckling. S. H. E.....324
—Concrete screed, Pasadena.....(n)*1236
—Concrete surface finishing, Quogue-Southampton road. Tuthill.....(n)1092
—Concrete symposium, Albany Engineers'... 864
—Concrete tracks for earth road. Warner, *469, Brick wheelways in Holland. Spaander *714
—Curved curbing, Computing paving outside of. Lewis.....*463
—Dallas, Tex.—Two-course concrete paving on gumbo soil in University Park. Meyers 706
—Denver pavement-construction records.....*271
—Edging for asphaltic pavements.....(n)*464
—Filler and stretcher paving blocks, Nelsonville .....(n)*580
—Ill.—Vermilion Co. roads—Catchbasins and culverts *209, Planning and organizing for paving.....*248
—Los Angeles Co. special concrete pavement for motor trucks *639, Patching machine, (n)*412
—Macadam cleaner and bitumen spreader, Finley .....(n)*820
—Macadam held to be pavement.....(n)1023
—Macadam roads, Resurfacing, with small brick cubes, Monroe Co., N. Y.....827
—Macadam roadway, Rebuilding—Prize offer for articles, 805, 997, Award.....1237
—Middleboro, Ky., paving cost assessment at street intersection.....*801
—Minneapolis paving by day labor.....(n) 913
—Motor trucks ruin imprvd. granite-block pavement, W. 42d St. N. Y. *691, Time to stop road destruction by motor trucks 710, Truck springs to save pavements, San Francisco. Claussen 904, Motor-truck menace to street pavements; vehicle limits, various places. Stern 938, Cleveland rules 719, N. Y. State highway problem 1007, N. J. engineers tackle problem.1054
—Nashville, Tenn., litigation.....(n) 210
—Nebraska—Douglas Co. paving.....(n) 286
—New Orleans, Slag cement in.....(n) 770
—N. Y. Cy.—Brooklyn—Granite-block pavement for residential street, Bedford Ave..*491
—N. Y. Cy.—Paving methods in Manhattan Borough revised—Engineer Stern's report—Concrete foundations; creosoted wood; night work; asphalt as granite-block filler.....397
—N. Y. State—Thicker roads.....443
—Owensboro, Ky.—Prorating paving cost among property owners. Talbott.....*14
—Paving mixture, Vibrating concrete makes dense; Stubbs' "Vibrolithic" pavements, Dallas, White Plains, etc.....*1120
—Phila.—Inspecting bituminous materials at refineries 27

Page

PAVEMENTS—Continued
—Pueblo corner inlet, catchbasin, curbing, etc. *77, (n) 224, Railway street crossing .....(n)*464
—Road pavements, Cost of concrete and other permanent. Wulff.....1240
—Roads in arid West.....*480
—St. Louis specifications, Changes in.....58
—St. Paul paving by force account.....(n) 900
—San Francisco—Dump-wagon cable system. Owen *272
—Santa Monica, Calif., paving bids in competition with contractors.....(n)577
—Sidewalk-roughing tool, Gardner..(ns)288, *628
—Sioux Cy. concrete pavements *165, A revolutionary improvement—Applying dry mix 226, More details. Johnson 830, Dished surface for concrete on hilly roads *214, Motor truck as dinkey...(n)*274
—Slipperiness test pavements, Mass...1162, *1141
—Spokane—Asphalt-pavement costs with municipal plant. Cunningham.....375
—Steel, Sheet, for paving, Charlotte, N. C...*946
—Testing road-building materials, Cost of, N. Y.....455
—Wash. Co., Wash., roads, Experience in paving. White.....844
—Wood-block expansion joints in concrete pavements, Wichita, Kan. Brockway... 905
—Wood blocks, Are bleeding, really bleeding joints?—Minneapolis expts. Dutton....*737
—Wood flooring Chi. bascule bridges; hexagonal blocks.....*220
Payta, Not so dry in. Wheeler.....371
Peace, May it be purchased at too high a price? 413
Pearse, L. Activated sludge.....109
Pen, Norrman's rapidly adjustable ruling....*273
Penland, J. R. Pavement cost.....103
Penn-Mary steel merger.....(n) 93
Penney, W. T. Raising bridge.....*1088
Pennichuck Water Co.'s forestry.....*472
Pennsylvania R.R. See "Railways."

PENNSYLVANIA
—Beaver Val. Water Co. appraisal.....(n) 333
—Concrete road, Easton-Allentown.....(n)912
—Employment-agency licenses.....(n)625
—Flood conference.....(n) 818
—Highway accidents, State not liable for.(n) 690
—Highway maintenance, State, cannot be forced .....(n)939
—Macadam held to be pavement.....(n)1023
—Planning Commissions, State Asso.....(n) 143
—Stream-flow conservation.....(n) 827
—Turnpike ordered paved.....(n) 625
—Water companies cannot require meters.(n) 189
—Water-Conservation Comm.....(n)1106
—Water-Supply Comm. report.....(n) 893
—Workmen's compensation report.....(n) 217

Periscope, Elevated track inspection by..(n)1186
Permutit Co.'s patented words.....(n) 676
Perry, C. N. Earth-road maintenance in irrigated lands.....297
Peru—Payta not rainless. Wheeler.....371
Peters' precise-leveling methods, *74, (n) 1041, 1159
Peterson, A. Montreal centrifugal pump....835
Petroleum conservation.....1144
Petroleum from Calif. gusher, Storing and measuring. Roalfe.....*1066
Petroleum, Influence of viscosity in pumping. Collins 22
Petroleum reservation for Navy.....(n)1202
Petroleum reservoir, Concrete-lined, El Segundo, Calif. *849
Petroleum supply, Future sources of.....1189
Phelps, C. C. Subaqueous excavation *171, Drill barge in Everglades.....*704
Phelps, E. B. Sewerage terms.....955

PHILADELPHIA, PENN.
—Engineers, City wants.....(n) 332
—Engineers' Club—Paper by Hess 278, Proceedings .....(n) 237
—Highways Bureau report—Sewer inspection 17, Bituminous-material inspection 27, Most sewers new. Datesman.....181
—Municipal auditorium.....*188
—Pumping-engine crank weld.....1140
—Terminal ry.; new piers *260, Continuous package elevators. Edsall.....*406
—Water-consumption record.....478
—Water meters 710, Davis.....720
—Water rates. Trautwine.....761

PHILIPPINE ISLANDS
—Aërial tramway, bridge substitute..... *12
—Concrete, Reinforced, cracking caused by salt water.....1047
—Radio towers, Erecting Canacao.....(n)*320
—Railway completed, Manila-Hondagua..(n) 141
—Road work, Motor trucks for.....(n)*966
—Sewers, Charging for use of.....1193
—Tres Cruces dam repair, Cavite. Bennett.*1026

Phoenix, N. Y.—Fire.....(n) 674
Photo.—Marking brown print white. Godfrey, 1141, (n)1001
Photogrammetry for taking topography of watershed, Canada. Neiles.....*878
Photos. of concrete reinforcement.....563
Pier. See also "Wharves and docks," "Bridges," "Foundations," etc.
Pier, Cylinder, foundations laid in sheetpile wells, Buffalo G. E. power house. Boardman *289

Page

Pierce, D. T. Road-maintenance costs, N. Y. 807
Piers, Building Tugaloo Riv. bridge.....*899
Piers, Capping old P. & R. bridge, Harrisburg, under traffic.....*703
Piers fail, Brick wall, Roxbury school...*262, 614
Pikes Peak motor highway.....(n) 286

PILES
—Bear Lake pumping-station foundation.... *98
—Bridge abutments—Cost of piles vs. increased depth..... 270
—Chi. freight station, P. R.R., pile tests..... 801
—Concrete piles, Bottom-driven, on Govt. job—Federal Bldg., Wilmington, N. C. Howell *1207
—Concrete piles, Redondo Beach pier.....*518
—Dam, Sevier Bridge, Utah, sheet-steel piling *398
—Hollow piles, driven with point, underpinning with, Bklyn. Edison station. Knight *982
—Jetting practice, N. Y. Cent., Chi. & N.W., So. Pac.....(n) 950
—Hammer, Formula modified for double-acting 29, Knowles..... 417
—Piledriver, Special, with adjustable leads, Brooklyn Edison station.....*463
—Piledriver, World's tallest, for 115-ft. piles, So. Pac. office bldg., S. F.....*509
—Piledrivers designed and built by three rys.—Chi., Mil. & St. P., Grand Trunk, Ill. Cent. *1136
—Piledriving rigs, Two light, at Lake Quinsigamond bridge, Worcester.....*462
—Piledriving rules for 10 rys.....(n) 900
—Salamanca bridge—Constructing pile foundation in hard gravel; use of pile points; driving costs; pile sheared by boulder. Steere *338
—Sheetpile driving, St. Louis sewer—Pile-hammer leads mounted on rollers.....*658
—Sheetpile driving with drop hammer, So. Ry. .....(n)*1092
—Sheetpile, Steel, coffer-dam, for lock on Cape Fear River..... 549
—Sheetpile, Steel, coffer-dams, Hudson River, at Troy. Watt *533, Pulling the piles, *408, 613, Pile hammer.....*603
—Sheetpile wells, Cylinder-pier foundations laid in, Buffalo G. E. power house. Boardman *289, Inverted hammers pull coffer-dam piles of condensing-water tunnels *510
—Sheetpiles of coffer-dam, P. & R. bridge, Susquehanna Riv., Milton, Penn.—Pulling by locomotive crane *509, Cinders make steel sheeting tight in swift current, *558, Coffer-dam frame or templet...(n)*610
—Sheetpiling, New section of Lackawanna steel .....(n) 96
—Sheetpiling pulled with backfilling machine, St. Paul sewer.....(n)*175
—Sheetpiling, Recovering steel—Various instances 612
—Sheetpiling, Steel, for connecting Narrows siphon to Staten Isl. main.....*782

Pinning rock slag to save bridge. Warnecke, *358, 367
Pins, Strong dredge. Young.....(n) 633

PIPE AND PIPE LINES
See also "Siphon," "Culvert," "Valve," "Aqueducts," "Sewers," "Water mains" and other water topics.
—Bichloride of mercury, effect.....(n)616
—Brass-tube cracking and its cure. White.. 87
—Concrete pipe, Reinforced, used for culverts on western railways.....*592
—Corrosion-resistance test with aërated water. Speller.....(n) 639
—Culvert pipe, Sledding large steel, over Ariz. hills.....(n) *32
—Derrick, Portable, laying pipe.....(n)*364
—Fittings, Insuluminum.....(n) 288
—Gas case, Buffalo, Unit prices for street mains in. Humphreys..... 516
—Joint compound, "Superior" flexible sewer, (n) 288
—Malone, N. Y., supply main sustains capacity for 28 years..... 461
—Narrows siphon, Connecting, to Staten Isl. main; Sliding pipe down inclined track..*782
—Oil, Influence of viscosity in pumping crude. Collins 22
—Roughness of steel pipe after 22 years' service, Glenwood Springs, Colo.; Kutter's formula coefficient. Reynolds..... 896
—Sewer, Binghamton builds intercepting, with four river crossings. LaRoche.....*1227
—Steel and wood water mains, Butte, (correction n) 134
—Submerged orifices and tubes, Experiments with. Rogers, Smith.....*825
—Suction pipe, Steadying. Brown.....*1185
—Twin-pipe problem solved by hydraulic slide-rule. Hazen..... 85
—Varied uses of pipe; relative quantity, wrought-iron and steel.....(n)*660
—Venturi meters inaccurate on lively lines. Hazen 293, Ledoux, Gore..... 514
—Vitrified pipe for well casing.....*461
—Vitrified-pipe sewers, Aids to estimating cost of. Kirchoffer.....*780
—Water losses, City systems.....958, 960
—Water mains, Finding leaks and weaknesses in Baltimore..... 991
—Water-pipe inspection, Cast-iron, Chi...(n) 700

Page

PIPE AND PIPE LINES—Continued
—Water-pipe laying job, Miss. Riv. plays with, Minneapolis. Herrold *1038, Laying pipe with trenching machine.....(n)*224
—Water-service pipes, Macbee cement-coated, (n)*724
—Water pipes—N. E. W.-W. Asso. reports, etc. 570, On water-works service pipes, 594, Why not a better joint for water mains? 951, Water losses.....958, 960
—Wood-stave pipe-line reconstruction, Seattle, and other plans..... 42
—Wood-stave water main, Madison-Anson; service connection.....*542
—Water-wks. relics, N. Y. Cy.—Wood piping, valve, etc.....*1243
Pitot tube, Difficult pump test with, West Sacramento. Grunsky *8, Gregory..... 180

PITTSBURGH, PENN.
—Automobile racetrack proposed.....(n)674
—Bridge, Herron Ave.....*647, *1034
—Bridge, Point, ornamental portals..1238, *1242
—Bridges, Raising of Allegheny..... 427
—Cliff, Concreting to support.....*359
—Concrete flat-slab ruling and Seattle test. Lord 85, Godfrey..... 279
—Penn. terminal plans.....(n) 237
—Schenley High School—Reinforced-concrete patent decision. Godfrey..... 668
—Taxation changes proposed.....(n)1009
—Transit commissioner.....(ns)722, 912
—Tunnel will not be built.....(n) 45
Pittman, E. W. Cost of steel work.....1169
Pittsfield, Mass.—Dam contract case..... 53
Plane, Hodge light road.....(n)*1204
Plane table and transit, Combination of, for topography. Johnson *488, Sherrill.... 905
Plank roadway, Portable, Calif.....(n) 708
Plant, Post-mortem appraisal of industrial. Higgins *600
Plate girders, Handling 28-ft., in Chi. tunnel.*972
Plate girders, Light exclusion by.....(n) 863
Platform, Double-derrick, for open-dredging caisson, Bear Lake, Utah.....*408
Platform shelters of concrete, Unit const., So. Pac., Los Angeles..... *73
Plattsburg dam failure. G. M. B..... 84
Plimpton, A. L. Tunnel surveying.....1141
Plumb-bob suspension, Scranton.....*684
Plumb-line reflector.....(n) 412
Plumbing—Cleveland Bldg. Code. Drayer.... 328
Plumbing device, Screw-adjusted.....*410
Pneumatic. See also "Air," "Concrete."
Pneumatic concreting. Graham.....*386
Pneumatic mixer lines Sandy Ridge tunnel...*936
Poland spring water tank.....*692
Pole, Flag, design, U. S. Navy.....(n) 804
Pole holes, Blasting.....(n) 412
Poles, Jacking out.....(n)*708
Politics, Changing highway officials for, expensive 1202
Politics, Engineers in. Desmond 445, Dabney, 1001, Sherman, Spaander, Randolph.....1145
Pomona, Calif.—Flood protection.....(n) 817
Ponton bridges, U. S. Army. Barbour.....*156
Popolopen steel arch.....*337
Population-expectancy curve. Moore.....*844
Port Authorities meet, Montreal..... 623
Portland cement. See "Cement," "Concrete."
Portals, Ornamental, for Pittsburgh Point bridge 1238, *1242
Portland Cement Asso. laboratory adjunct, Lewis Inst. (n)673, Concrete-pavement maintenance survey.....(n)1154
Portland, Ore.—Survey. Hardesty..... *55
Portsmouth, Va.—Manager wanted..... (n) 625
Post-bellum influx unlikely..... 563
Postal rates bill, Second-class.....1187
Postcard advertisement, Contractor's....(n)*1042
Potash as valuable cement-mill byproduct—Cottrell process at Security Cement & Lime plant. Hewitt *1222
Potomac bridge plans, New.....(n) 332
Potter, A. Sewage treatment 855, Water filters and typhoid, St. Louis.....1047
Potts, C. Balt. Imhoff tank foams.....*469
Potts, J. C., on transfer charges..... 415
Powdered coal. See "Coal."
Power-house foundations, Buffalo G. E.*289, *510
Power plants, Commonwealth Edison, *52, *1040, *1045
Power plants, Hydraulic. See "Water power."
Power station, Ford steam and gas.....1085
Power stations, Linking up British.....(n)1166
Pratt, M. D. Rail corrugation..... 217
Pratt, R. W. Activated sludge, Cleveland, *1061, *1124, (n) 110

Preparedness. See "War."
Press, 1,000-ton, for briquetting metal waste, Hydraulic Press Mfg. Co.'s.....(n)*628
Pressure gage, Lanham "Manograph" differential, made by Water-Wks. Equip. Co..(n) 96
Prices, Rapid changes in market, affect engineering problems 1043, No bidders on city contracts 1044
Prices, Unit, for street mains in Buff. gas case. Humphreys..... 516
Pritchard Lake pumping station.....*556
Prize-fight seat-stand collapse.....(n)*578
Prizes offered for articles 805, 997, 1187, Awards 1237
Problem, 3-point, solution. Higgins.....(n)*610
Professional misfits. Wilson 388, 414, Buff, 585, Ruggles 713, Holden..... 873
Progress on construction, Specifying.....(n)364
Propellers, Power loss in, due to rough surface. McEntee 1173

Page

Proportional limit equal to elastic limit: Howard; A. S. T. M. discussiou.....41, 89
Providence, R. I.—Water filtration..... 427
Public buildings raid on the Treasury, Another 1238
Public Comfort Station Bureau..... 277
Public health. See also "Sewers," "Water pollution and purification," "Sanitary," "Health," "Infantile paralysis," "Typhoid," etc.
Public Health Asso...831, 858, 859, 876, 901, 955
Public Health school, Rockefeller Foundation's, at Johns Hopkins..... 131
Public question, Engineers who "butted in" on—Montreal water-power plant, 1043, *1048, (n) 1010
Public questions, Local sections of engineering societies on..... 806
Public questions—Should technical societies influence legislation? Hess, Q. E. D. 278, Members' political activity. Desmond 445, Dabney 1001, Sherman, Spaander, Randolph 1145
Public Roads, Office of. See "U. S. Dept. of Agriculture."
Public servant—Residence requirements. King 413, Green..... 565
Public service. See also "Rates," "Valuation," "Service," etc.
Public Service Comn. ruling, Penn.—Water companies cannot require meters.....(n)189
Public-service directors, Cleveland, Engineers needed for. Fesler..... 866
Public service, Organization of engineers for. 672
Public-utilities board, N. O.....(n) 333
Public-utilities comm. orders, Limit set to court review of, in N. Y. gas case..... 865
Public utilities, Side lights on depreciation of. Barker.....1167, 1212
Public utilities, Strong talk about. Cooke... 816
Public Utilities, Towne's plan to prevent strikes on..... 757
Public Works, Urging a Federal dept. of. Ripley 84
Pueblo, Colo.—Corner inlet, catchbasin and curbing *77, (n) 224, Railway street crossing .....(n)*464
Pulleys, Removing rusted-on.....(n) 80

PUMPS AND PUMPING
—Air lift—Chi. "Baker" injector.....(n)*384
—Aurora, Ill., well-pumping plants.....*1122
—Automobile engines, Zin-Ho pump and generator outfits with.....(n) 240
—Bear Lake water-power storage reservoir with pumping station, Utah Power & Lt. Co.'s; pumping water for power; construction resembling turbine plant *67, 83, Pumping-station foundation caisson, *98, *172, 178, Double-derrick platform.*408
—Boston fire-pumping station.....(n) 626
—Centrifugal boiler-feed high-speed pump, Cameron .....(n)*384
—Centrifugal pump, Montreal. Gibson, Burford 133. More data. Peterson..... 835
—Centrifugal pumps dispose of quarry waste, Upper Hudson Stone Co.....*508
—Chain-driven trench pump, Waterloo...(n)*480
—Contractors' pressure pump, Barnes....(n) *96
—Diaphragm pump, Gasoline-driven, Barnes, (n)*144
—Diaphragm pump, Hinman power-operated, (n)*192
—Diaphragm pumps, Elec.-motor driven, Domestic Engine & Pump Co.'s.....(n) 384
—Drainage-pump foundation design is dam problem, New Orleans. Hutson.....*838
—El Paso—Pumping 7,500,000 gal. daily by air lift.....*204
—Elec. plant for drainage, Spring Lake dist., Ill. 419
—Electro-pneu. outfit, Hill.....(n)*480
—Flood-wrecked well and pumping system, Restoring, San Diego, Calif. Francis....*980
—Flooded pumping plant, Salvaging Oceanside Mutual Water Co.'s, San Luis Rey River, Calif. Silent.....*125
—Gaso.-measuring pump errors.....(n)860
—Hair pumping, Wilder-Manning tannery.(n) 610
—Holland, Draining North. Spaander.....*773
—Hydraulic ram, Old siphon-operated. Palmer *164
—Lewiston, Me., pumping by water power....*441
—Manhole pump, Rochester elec.....(n)*176
—Oil, Influence of viscosity in pumping crude. Collins 22
—Portable gasoline pumping outfit, Evinrude, for construction work.....(n)*336
—Pritchard Lake pumping station of Natomis Co., Calif., for drainage and irrigation..*556
—Phila. engine-crank weld.....1140
—Screw propellers, Power loss in, due to rough surface. McEntee.....1173
—Sewage pump house, Building Albany, Vernon *738
—Sewage-pumping station, Brooklyn automatic. Gersoni *810
—Shrewsbury, Mass., pumping station, *433, (n) 616
—Sioux Cy. booster pumping station for water-supply to a suburb.....1017
—Sioux Falls pumping plant with oil engines *840
—Suction pipe, Steadying. Brown.....*1185
—Test, Difficult centrifugal-pump, with pitot tube, West Sacramento Reclamation Dist. Grunsky *8, Gregory..... 180
—Tunnel grouting with pumps, Milwaukee Shore. Warren.....*702

Page

PUMPS AND PUMPING—Continued
—Waterwheel for irrigation, Philippines.....*409
—Wheaton, Ill., Producer-gas engines drive water-wks. pumps.....*602

Putlogs, Placing scaffold.....(n)*176
Pyrometer, Gibb Co.'s "Irite".....(n) 288

Q

Quarry blasting, Well-hole. Russell.....(n)1042
Quarry waste, Centrifugal pumps dispose of, Upper Hudson Stone Co.....*508
Quarries, Kensico dam. Smith.....*250
Quebec bridge—South cantilever arm completed. Meyers *298, 321, Suspended-span hoisting details; floating, jacking, etc. Meyers *420, Suspended-span erection. Meyers *522, Pictures *349, Credit deserved Duggan 468, Full-load secondaries were eliminated. Mayer 517, Suspended span collapses 513, Barker *524, What caused disaster? 528, What happened at Que.? 561, Sympathy of engineering profession 563, Full evidence (with insert sheet) *572, Company will rebuild 575, Regrets Cooper, Deans, Turner 622, Stresses in rocker casting *650, 661, Bilderbeck, Witmer, Keast 760, Baird, Anon., Foulds *857, Turning moments on suspended-span supports. Foulds *1191, Engineering problem without a precedent—Raising span 709, Inquiry. S. R. B., (n) 664
709, Inquiry. S. R. B.....(n) 664
Queens Borough, N. Y. Cy., refuse incinerator. Woodman *598, 1000, Withington...1000
Queensboro bridge Waddell, Lindenthal....1177
Quicksand, Cleaning outfall sewer of, Great Bend, Kan.....(n) 464
Quicksand, Manholes built in, with open caisson..... 30

R

Radebaugh tunnel work.....124, *254, 276
Radio. See "Wireless."
Rail breaking after 10 years wrecks train, Western Md.....366, (n) 332
Rail-corrugation causes. Pratt..... 217
Rail fastenings, Experimental, D., L. & W.—Hooked tie-plates with screw spikes and through bolts *727, O. K. nut-lock....(n)*1060
Rail, Guard, holder for frogs and curves, Mitchell "Betts".....(n)*1248
Rail joint, Clapp's grip-type, C. & N. W. Ry..*735
Rail joints subjected to severe test, So. Ry. washout.....*490
Rail price raised.....(n)1010
Rail wear on curves, Locomotive-flange oiling to save, N. Y., S. & W..... 853
Rails and fastenings, Oiling, to prevent corrosion. Neafie.....*847
Rails—Cure for transverse fissures claimed found by Dudley, N. Y. Cent. 332, Troubles not yet ended..... 365
Rails, New grooved girder—Brooklyn, Baltimore and A. E. R. A. heads compared; Cram's statement, etc.....*418

RAILWAYS
See also "Electric," "Subways," "Elevated," "Cable," "Bridges," "Tunnels," "Locomotives," "Car."
—Alaska railroad progress 672, Station-men system succeeds 995, Leveling experience *1037
—Am. Ry. Asso.—Crossing signals 285, Daylight saving 1044, (n) 1058, Preparedness to transport troops.....(n)1011
—Am. Ry. Bridge & Bldg. Asso.—Meets at New Orleans 816, Experience of 41 rys on small concrete jobs 849, Piledriving rules of 10 rys. (n) 900, Pile-jetting practice..... (n) 950
—Am. Ry. Eng. Asso.—Track spike.....*1215
—Atchison, T. & S. F.—Ark. Riv. K-truss bridge *104, Turntables *828, Wedge tie-plates for track under them *571, Calif. decision, state cannot compel railway construction..... (n) 985
—Atlanta, Ga., New terminals planned.....*715
—Atlanta, Birm. & Atlantic—Valuation 892, Erratum.....(n)1001
—Australian Transcontinental.....(n) 286
—Balt. & Ohio—New chief engineer 42, *138, Tunnel ventilation (n) 261, Trimming cuts.....(n)*756
—Bolt and screw sockets, Tenax expansion, (n)*1012
—Boston & Maine—Try state ownership.... 467
—Braking with elec. motors—Linebaugh's review of progress..... 902
—Calif. R R. Comm.—Safe grade crossings.*1185
—Canadian ry. investigating comm.....(n) 333
—Can. Pac.—Rogers Pass tunnel. Tracy, *411, (n) 94
—Car-demurrage rate increase.....(n)1202
—Car, Dump, types.....*581, 611, *640
—Car-wheel flanges and frog clearances.... 34
—Carolina, Clinchfield & O.—Sandy Ridge tunnel.....*899, *936
—Cent. R R. of N. J.—New chief engineer..*138
—Ches. & Ohio Nor.—Night-work cost..... 323
—Chi., R. & Q.—Kan. Cy. bridge work *31, Metropolis bridge strut tests *49, 81, Metropolis bridge described *151, (n) 1154, Erecting and swinging 720-ft. span of Metropolis bridge *1198, Improvised dump-car.....*1184
Page

RAILWAYS—Continued
—Chi., Mil. & St. P.—Electric traction a success *24, Whittemore's services *140, 182, Elec. braking 902, Proposed Cascade Mtn. tunnel *928, 953, 1190, Piledriver.....*1136
—Chi. & N. W.—Impvts. at Clinton, Ia. *102, Bascule bridge, Chi. *284, Grip-type rail joint.....*735
—Chi., Rock I. & Pac.—Slab-deck concrete bridge over highway *1002, Locomotive crane for concrete-bridge work.....*1172
—Chicago Union Station, Lowering tunnel for.*968
—Chilean Trans-Andean—Ladder dredge for snow..... (n) 843
—China, Development of Govt railways in. Wang 540, Am. company to build railways in 673, G. A. Kyle to be engineer.....*814
—Cincinnati, New terminals for.....(n) 866
—Cin. Southern—Cincinnati bridge reconstruction..... 92
—Clearances in Switzerland.....(n)1007
—Coal pits, Waterproof, and fireproof ashpits.*635
—Culverts, Reinforced-concrete pipe used for, various western roads.....*592
—Cumberland Val. See "Railways—Penn."
—Curves measured on arc or chords. Raymond, Haynes 86, Kitts 324, Table of chords. West.....(n)1186
—"Curves, Reforming railway." Lavis..... 468
—Del., Lack. & West.—Experimental rail fastening—Hooked tie-plates with screw spikes and through bolts *727, Nut-lock, (n) *1060, Bridge-arch centers suspended from old plate girders *846, Oiling rails.*847
—Denver & Salt Lake—Moffat tunnel finance, (n) 141
—Depreciation problems. Barker.....1167, 1212
—Ditcher with three sets of engines, Browning..... (n)*335
—Eight-hour day 321, 413, 465, 757, (n) 94, Petition by unorganized employees. Frazier..... 714
—El Paso & S. W.—An 1857 locomotive parked.....*101
—Engineering dept. of a railway, Organization of. Hendricks..... 989
—Erie—N. Y., Susq. & W.—Locomotive-flange oiling..... 853
—Ft. Worth & Denver Cy.—Lining well.....*608
—Freight, Prompt unloading of, to prevent car shortage..... 511
—Freight yards, Lighting—Asso. Ry. Elec. Engineers.....*1134
—Grade templet, Adjustable. Teddy.....(n)1092
—Grand Trunk—Rock excavation for drydock, Prince Rupert. Phelps *171, Piledriver.....*1136
—Gt. Nor.—Proposed Cascade Mtn. tunnel *928, 953, 1190, Landslide (n) 935, Electrification..... (n) 914
—Hempfield railroad, Utilization of portions of old. Low..... 181
—Hudson Bay—Investigation.....(n) 914
—Ill. Cent.—Car-repair shed *474, Chi. terminal to cost $20,000,000 624, 1200, Piledriver *1137, Tractor and plows dig out gravel layer.....(n)1041
layer.....(n)1041
—Indianapolis & Frankfort. See "Railways—Penn."
—Internatl. Rys. of Cent. Am.....(n) 137
—Jacksonville, Fla., union station.....(n) 429
—Japanese railways, Widening.....(n) 505
—Kan. Cy. (Kan.) Terminal—Gets 200-yr. franchise..... 814
—Lehigh Val.—Buffalo trainshed with columns between tracks *390, Terminal built over drainage channel. Hurlbut..*436
—Los Angeles—Grade checks at railroad street crossings..... 462
—Minn., St. P. & Sault Ste. M.—Ashland ore dock. King.....*242
—Monorail railway, Suspended, Calif.....(n) 578
—N. J. freight terminal, Bayonne, for port of N. Y.....*90, 962
—N. Y. Cent.—Rail transverse-fissure cure 332, 365, West Shore—Rock slab pinned to save bridge. Warnecke *358, 367, Elec. track tampers. Vaughan.....*946
—N. Y., Chi. & St. L. (Nickel Plate)—Track depression, Cleveland.....(n)*1042
—N. Y., N. H. & H.—Crossing signals (n) 419, Life of rolling stock.....(n) 831
—N. Y., Susq. & West. See "Railways—Erie."
—Nickel Plate. See "Railways—N. Y., Chi. & St. L."
—Norfolk & West.—Elec. braking..... 902
—Passenger-terminal cost. Bikle.....(n)1215
—Penn. system—Water-quenched steel axle equal to oil-quenched 88, Louisville bridge reconstruction 92, Radebaugh tunnel repair progress 124, Jacketing it by mining methods *254, Its costly maintenance work 276, Stone-bridge repair 131, Chi. freight station—Pile tests 801, Tower derricks for erecting frames *802, Grade-crossing dangers 854, Position-light signals *877, (erratum n) 1193, New railway in Indiana—Vandalia's "Indianapolis & Frankfort" *1132, Cumberland Val.—Susquehanna Riv. bridge work, Harrisburg *385, *764, Vandalia—Long fill built from borrow *800, Pittsburgh terminal plans (n) 237, Signal color scheme changed (n) 285, To enter Detroit.....(ns) 530, 674
—Phila. terminal ry.; new piers *260, Package elevators.....*406
Page

RAILWAYS—Continued
—Phila. & Reading—Milton bridge work *509, *558, (n) *610, Harrisburg bridge pier capping under traffic.....*703
—Philippine railway completed.....(n) 141
—Pittsburgh, C., C. & St. L. (Panhandle)—Concreting cliff to keep it from falling on tracks.....*359
—Price of railway supplies.....(n)1221
—Pueblo, Colo., street crossing of A., T. & S. F.....(n)*464
—Rates that help cities at expense of country—N. J. case against preference to N. Y 129, Relation between road and terminal costs. Neall 324, Eliminating cost of transfers on through routes..... 415
—Rerailer, Johnson dump-car.....(n)*432
—Roadmasters and Maintenance of Way Asso.—Seasonal distribution of work; anchoring track; tie spacing; elimination of slot spiking; equating track values; table of labor distribution..... 623
—Rock I. See "Railways—Chi., Rock I. & Pac."
—Russian railway-building prospects..... 177
—St. Gothard electrification.....(n) 622
—St. Louis river terminals.....216, *1216
—St. Louis & San Francisco—Memphis grade-crossing elimination.....*160
—St. Paul union station.....(ns) 865, 914
—Salvador, Projected ry in. Blackford..(n) 137
—Sao Paulo Ry., Brazil, cable inclines. Molitor.....*976
—Signal, Union grade-crossing.....(n)*1204
—Signals, Standard crossing warning..... 285
—Smoke-abatement convention..... 673
—Southern—Rail joints held in washout *490, Building culvert for 150-ft. fill *850, Contractors' daily records *897, Tugaloo Riv. bridge piers *899, Dumping trestles *948, Concrete and earth instead of steel viaducts 1043, Heavy grading on 50-mile relocation *1075, Chuting concrete *1182, Loco.-axle break report (n) 913, Driving sheetpiling (n) *1092, Dumping rock off high trestles.....(n)1236
—So. Pac.—Platform shelters, Los Angeles *73, Spotting snowshed fires *458, S. F. office-bldg. piledriver.....*509
—Strikes, Public interest in—Frazier's views 321
—Switch, Call ry., on Bklyn. R. T.....(n)*772
—Switch, Twin Cy. "Dunn" split.....(n)*1156
—Tampers, Elec. track. Vaughan.....*946
—Tangent of compound curve, Determining. Beal.....*993
—Texas Midland—Valuation report..... 892
—Ties, Repairing narrow-gage steel.....(n) 950
—Track shifter, Hill Annex mine.....*1086
—Track weeding, Chemical. Chipman.....1047
—Tunnel, Proposed 30-mile, under Cascade Mtns. Chittenden.....*928, 953
—Union Pac.—New line through Echo Canyon, Utah; double-tracking; profile *700, Mo. Riv. bridge renewal (ns) 92, 101, Various impvts.....(n) 963
—U. S. Congressional investigation.....(n) 333
—Valuation—Inventories and histories. Low 181
—Valuation reports, First complete 892, Erratum.....(n)1001
—Valuation surveys may be made useful. Dunlap..... 36
—Vandalia. See "Railways—Penn."
—Wabash—Grade elimination in Ft. Wayne *241, 277, Mo. Riv. bank mattress.....*1022
—West Shore. See "Railways—N. Y. Cent."
—Western Md.—Rail break wrecks train, 366, (n) 332

Rainfall data interpreted by laws of probability; Hartford data. Saville.....*1208
Rainfall, Effect of seasonal, on annual run-off, Chemung Riv., N. Y. Wells.....*792
Rainfall, Funds needed to study; W. Va. flood.....321, 331, 381, *428
Rainfall, Long-time N. Y., basis for sewer design; "average-rate" and "uniform-intensity" methods compared. Hufeland, *393, *450
Rainfall, 142-in., Alaska. Dow.....(n)*756
Rainless, Payta not. Wheeler..... 371
Rains, Phenomenal, cause Southern floods, bridge destruction, etc. 140, *183, *232, 331, *360, *490, *815, (ns) 429, *560, 756, *924, Exhibited by charts. Henry *886, Some heavy rainfall records elsewhere. Allen.....1001
—Contractor discusses bridges damaged by floods.....1233
Ralston drop-bottom cars.....*643
Ram, Siphon-operated hydraulic, of long standing, in Conn. Palmer.....*164
Randolph, I. What established engineer owes to beginner 1102, Engineers in politics....1146
Range finder and clinometer, Young's.....*1183
Range-finder patent. Haynes.....1239
Rapid transit. See also "Railways," "Electric railways," "Elevated railways," "Subways."
Rapid-transit surveys, Cincinnati.....(n) 674
Rapid-transit system future, Chicago; map, 1104, *1148

RATES
See also "Valuation," "Service," "Public."
—Boston elevated-railway finance.....(n) 860
—Car-demurrage rate increase.....(n)1202
—Elec. lighting, Cleveland municipal..... 603
—Elec. rates, N. Y. Cy.....(n) 914
—Gas and electric rates, Memphis (ns) 866, 1201

Page

RATES—Continued
—Gas case, Buffalo, Unit prices for street mains in. Humphreys..... 516
—Obsolescence in appraisals for rate making. Harshman 842, 854
—Public Utility Rates—Depreciation. Barker, 1167, 1212
—Railway rates that help cities at expense of the country—N. J. case against preference to N. Y. 129, Relation between road and terminal costs. Neall 324, Eliminating cost of transfers on through routes 415
—Railway-valuation reports, First 892, Erratum ..... (n)1001
—Water, Beaver Val., Penn.....(n) 333
—Water decision—Dentist's bowl.....(n) 926
—Water-rate forms, Mont. standard..... 648
—Water rates, Phila. 710, Davis 720, Trautwine 761
—Water Wks. Asso., New Eng.—Cost-of-service water-meter rates to the front 998, Suggestion for making rates..... 999

Raymond, C. L. Rochester sewer tunnel....*883
Raymond, W. G. Measuring railway curves 86
Reclamation. See "Irrigation," "Drainage," "Rivers."
Recording instruments. See "Instruments" and cross-references.
Records. See "Filing," "Accounting," "Cost," etc.
Redondo Beach, Calif.—Pier. Roberts.....*518
Redondo, Calif.—Water-meter results. Bowen 910
Reflector, Plumb-line .....(n) 412
Refuse. See "Garbage and refuse."
Relays, G. E.—Solenoid-control (n) *580, Reverse-phase .....(n)*868
Reports, Daily field, on Cleary-White construction work. Hailey *994, So Ry. contractors' *897
Requardt, G. J. Completion of Baltimore sewerage system *736
Rerailer, Johnson dump-car.....(n)*432
Research Council, National..... 720

RESERVOIRS
See also "Dams," "Water" topics.
—Backfiller trimming reservoir slope....(n)*1042
—Bear Lake water-power storage reservoir with pumping station, Utah *67, 83, *98, *172, 178, *408
—Concrete reservoirs built without forms, Cary and Elmhurst, Ill.....*894
—Crater Lake reservoir, Ariz.....*435, 467
—Divided authority, bad results..... 853
—Goose Lake Val irrigation.....*503, 809
—Madison, Wis.—Concrete wall tips when lining is removed.....*476
—Mass diagram Butcher.....*376
—Mouthpiece, New knowledge on standard Pardoe, Univ. of Penn.....*520
—Oil in reservoirs, Measuring.....*1066
—Oil reservoir, Concrete-lined, El Segundo, Calif. *849
—Omaha, Relining leaky reservoir.....*646
—Scour valve, Replacing against pressure, Katoomba, N. S. W. Kendall.....*173
—Sioux Falls reservoir with groined-arch floor *840
—Southern Power Co.'s big storage reservoirs, N. C. .....(n) 138
—Winfield, Kan.—Failure of concrete reservoir built on old stone wall.....*404
—Youngstown, O.—Milton reservoir for Mahoning Riv. control.....*1084

Residence restrictions for engineers 413, Green 565
Retaining wall—Bridge abutment wrecked by backfill .....(n)*804
Retaining wall, Building new, on old one, Santa Monica, Calif. Hasse.....*173
Retaining wall, Concreting Paw Paw.....*269
Retaining wall tips, Madison reservoir.....*476
Retaining wall, Weak, saved by anchored buttresses, Denver *30
Retirance—New term. Barker.....1167, 1212
Reversal of motor, G. E. relay for protection against .....(n)*868
Revetment, Board mattresses for.....(n) 660
Revetment machine, Concrete, for Miss. Markham *1070, 1094
Reynolds, W. L. Pipe roughness..... 896
Rice, G. W. Goose Lake Val. irrigation system 809
Richardson, C. Early asphalt pavements..1001
Rio Grande Project—Elephant Butte dam, *1015, (n) 685
Ripley, T. M. Urging a Federal Dept. of Public Works 84, Macadam-road maintenance with bituminous binders.....*1018

RIVERS
See also "Levee," "Flood," etc.
—Allegheny, at Olean, N. Y., flood prevention 721
—Ark.—Levee work Wight.....*1117
—Binghamton, N. Y., builds interceptor with four river crossings. LaRoche.....*1227
—Cape Fear River, Steel sheetpile cofferdam for lock on..... 549
—Chemung—Effect of seasonal rainfall on annual runoff. Wells.....*792
—Colo.—Surveying dam sites, Grand Canyon *306 (erratum n) 371, Diversion dam... 622
—Drift catcher, Mill Creek, Erie. Seelye *795, Flood channel.....(n) 286
—Fox Riv., Ill.—Pollution case ended....(n) 189

Page

RIVERS—Continued
—Genesee at Rochester, Developing more water power on.....*821
—Hudson—Albany municipal dock.....(n) 540
—Little Riv drainage dist., Mo.—Tracks for heavy excavators *76, River diversion and flood-control work described..*342, *740
—Los Angeles Riv. diversion from harbor.(n) 578
—Miami—Battle over flood-prevention plans. Chittenden *906, (n) 674, Plan approved, 1055, 1093, Ohio Conservancy act. Herschel 1190
—Mississippi—St. John dist. levee work *158, St. Louis terminals projected—Bowen's report 216, *1216 Supporting levee system. Dabney 228, Will traffic follow river improvement? Wilkinson 985, River plays with pipe-laying job, Minneapolis. Herrold *1038, Concrete-revetment machine *1070, 1094, Five days on the Mississippi. Wight *1114, To vote for bridge or tunnel at N. O. (ns) 477, 626, Channel change proposed, St. Paul.....(n) 977
—Missouri—Brush, stone and wire-mesh bank-protection mattress used by Wabash R.R. Everham.....*1022
—Naugatuck—Water storage .....(n) 626
—Ohio—Lock and dam work—Lubrication of construction machinery *317, Placing coffer-dams *1140
—Ore. State Engineer's Wallowa Riv. survey guides water adjudicators Cupper 5
—Penn. rivers, Coal dredging in.....(n) 644
—Penn. stream-flow conservation.....(n) 827
—Quequechan—Nuisance investigation...(n) 674
—Red—Board-mattress revetment .....(n) 660
—Right and left bank of a stream, Defining. Henderson 856
—River and Harbor bill. Ripley 84, St. Paul harbor changes 332, Limiting flow, Chi. drainage canals .....(n) 93
—Root Riv., Minn., Straightening, for land reclamation .....(n) 139
—Santa Ana—Rock-filled wire-mesh bags for flood protection *79, Jamaica uses such "sausages." Park 468
—Scioto—Widening channel, Columbus 1055, 1093
—Youngstown reservoir for Mahoning Riv. control *1084

Riverside Drive viaduct, Jacking.....*869
Rivets, Countersunk. Fleming..... 496
Roadmasters meet, Railway..... 623

ROADS
See also "Pavements," "Streets," "Bridges."
—Am. Highway Asso.—Moore's review of state legislation—Engineering work 1143, Road-material costs .....(n) 866
—Am. Highway Officials Asso.—Changing highway officials for politics expensive..1202
—Am. Soc. Mun. Imprvts. reports..... 766
—Ariz.—Iron culverts for arches.....*330
—Calif., What it has done with $18,000,000 road fund 101, Votes $15,000,000 more, ...(n)1009
—Concrete and other permanent road pavements, Cost of. Wulff.....1240
—Concrete pavements, Mich. omits joints in. Thomas 609, Wood-block expansion joints in concrete pavements, Wichita, Kan. Brockway 905
—Concrete pavements on sandy soils, Long Island Johnson 616, Hasbrouck 713, Types of surfacing for loose-sand foundation. Longshore 712, Contributor....1036
—Concrete-road building, Sioux Cy. *165, A revolutionary improvement—Applying dry mix 226, More details. Johnson 830, Dished surface for concrete on hilly country roads *214, Motor truck as dinkey, ...(n)*274
—Concrete-road building statistics.....(n) 577
—Concrete-road construction, Mich.—Pontiac-Royal Oak road—Baker machine for finishing; expansion joints, etc.....*1082
—Concrete road slabs, Creeping and heaving of. Sampson 134, Trego..... 369
—Concrete roads, Buckling of. S. H. E..... 324
—Concrete roads, Single-track, with turnouts—Inquiry .....(n)1193
—Concrete surface finishing, Quogue-Southampton road .....(n)1092
—Concrete surfaces, Canvas belt for finishing, Wayne Co., Mich. *654, 709, Resurfacing concrete pavement with reinforced concrete 690
—Concrete tracks for earth road, Warner *469, Brick wheelways in Holland Spaander *714
—Cost of good roads, Computing.....(n) 471
—Derrick, Byers' "Auto-Crane" traction, on municipal job, Flint, Mich.....*507
—Earth-road maintenance in irrigated lands, Imperial Val., Calif.—Flooding sides of road alternately, Perry..... 297
—Education in highway engineering, Conference on .....(n)1056
—Engineers, Competent, needed for road construction, Houston .....(n) 637
—Engineers, Demand for highway.....(n) 593
—Federal road-aid act 82, Examinations for engineers (n) 141, Funds apportionment to states (n) 238, State officials confer at Wash. (n) 381, Rules for applying money 521, Mich. to make most of appropriations, Thomas 795, Progress in various states 1054

Page

ROADS—Continued
—Federal $1,000,000 (Dept. of Ag.) for roads in forest states..... 380
—Florence, S. C., sand-clay street surfacing from sewer trenches. Mamitt.....*752
—Florida state highway work..... 259
—Georgia State Highway Comm .....(n) 479
—Gravel-road construction, Donaghy's.....1153
—Ill.—Alignment and drainage of rural highways; 90-deg. curve; grade-crossing safety, reducing speeding hazards on vertical curves, etc. Bilger *874, Road surfacing is not road building..... 901
—Ill.—Civil-service exams. .....(n)1200
—Ill. Highway Dept.—Bond and shear in reinforced bridge-footing offsets *18, (errata n) 325, Road specifications..... 127
—Ill.—Prize road-direction .....(n)*1092
—Ill. roads, Labor scarcity for.....(n) 577
—Ill.—Vermilion Co.—Catchbasins and culverts *209, Planning and organizing for paving *248
—Kan. road maintenance by contract, Moore 204
—Ky., contractors wanted. Wiley..... 616
—Louisiana highway-imprvt. problems, Solving, St. Tammany Parish. Huckaby....*544
—Los Angeles Co. patching machine.....(n)*412
—Macadam cleaner and bitumen spreader, Finley .....(n)*820
—Macadam maintenance with bituminous binders; Monarch motor-truck oil distributor, Jefferson Co., N. Y. Ripley..*1018
—Macadam roads, Resurfacing with small brick cubes, Monroe Co., N. Y..... 827
—Macadam roadway, Rebuilding—Prize offer for articles 805, 997, Award.....1237
—Mass.—Rough-surface asphalt *1141, Slipperiness test pavements.....1162
—Michigan (See also "Michigan")—Gravel roads economical. Rogers 392, Making most of Federal aid Thomas..... 795
—Missouri road imprvt., engineer's pay limit 757, Engineers unpopular.....(n)1021
—Motor trucks, Time to stop road destruction by *691, 710, Use of springs, Claussen 904, Truck regulations, various places. Stern 938, Cleveland rules 719, N. Y. state highway problem 1007, N. J. engineers tackle problem.....1054
—Nebraska—Douglas Co. paving.....(n) 286
—New Mex.—Wagon loader.....*361
—N. Y. State road policy 323, Progress report 443, Cost of testing road-building materials—Breed's report 455, What are road-maintenance costs in N. Y.? Pierce 807
—Northwestern Road Congress—Highway imprvt. in N. W. states.....1153
—Ohio—Baker scraper performance 32, State bids opened .....(n) 186
—Oiler, Cost of operating motor road, St. Paul ..... (n) 274
—Penn.—Easton-Allentown concrete road.(n) 912
—Penn. not liable for state highway accidents ..... (n) 690
—Penn.—State highway maintenance cannot be forced .....(n) 939
—Penn. turnpike, Berks and Dauphin Co., ordered paved .....(n) 625
—Philippine road work—Motor trucks...(n)*996
—Pikes Peak motor highway.....(n) 286
—Plane, Hodge light, inexpensive road (n)*1204
—Plank roadway, Portable, across Calif. sand hills .....(n) 708
—Public Roads, Office of. See "U. S. Dept. of Agriculture."
—Repetitious road discussions 177, Draney 278, Durham 416
—Rock breaking, Experiences with unemployed on, Los Angeles Martin..... 755
—N. J. conditions, Investigating 187, Wanted: state road policy 226, 323, Blundering legislation—Bond issue voted 997, Wulff..1240
—Roller, Finley's multiple-disk.....(n)*964
—St. Louis Co. bond issue valid.....(n)1202
—St. Louis Co. bonds valid.....(n) 188
—San Francisco—Twin Peaks Boul *504
—Sandy soils, Surfacings for loose—Macadam, etc. Longshore 712, Contributor.1036
—State road officials confer at Wash. 381, (n) 637
—Storm King road, Building.....*596
—Tex. proposed highway commission.....(n) 981
—Toronto-Hamilton concrete-road criticisms answered—Chief Eng. Van Scoyoc's report 911
—Utah roads, Earth handled cheaply in grading; tractor outfits.....*28
—Viaduct, Concrete side-hill, for brick highway, Dunham road, Cuyahoga Co., O...*352
—Wagon loader, Barbeau & Werring's Albrecht dragline, for roadwork, Minn. *78, (erratum n) 469
—Wash Co., Wash., roads, Experience in paving. White 844
—West, Construction and maintenance of roads in arid.....*481

Roalfe, G. D. Storing and measuring oil..*1066
Roberts, C. L. Redondo Beach pier.....*518
Rochester, N. Y.—Developing more water power on Genesee *821, Sewer tunnel, Raymond *883, Garbage reduction (n) 115, Manhole pump .....(n)*176
Rock breaking, Experiences with unemployed on road, Los Angeles Martin..... 755
Rock cliff kept from falling on tracks by concreting, Pittsburgh, C., C. & St. L.....*359
Rock crusher, Burning wedged sledge out of, ...(n) 364
Rock-crushing plant, Kensico dam.....*252

Page

Rock-filled wire-mesh bags for river protection *79, Used in Jamaica. Park..... 468
Rock slab pinned to save bridge. Warnecke *358, Dangers in solid rock..... 367
Rock, Subaqueous, excavated from platform, Grand Trunk drydock, Prince Rupert. Phelps *171
Rock-tunneling machine, App.....*340, 365
Rockefeller Foundation School of Hygiene... 131
Rocker casting, Stresses in Quebec *650, 661, Bilderbeck, Witmer, Keast 760, Baird, Anon., Foulds.....*857, *1191
Rockwood, C. R. Rockfill dam..... 622
Rodger ballast dump-cars.....*644
Roechling, H. A. Dr. Travis and the Imhoff tank 809
Rogers, F. F. Gravel roads, Mich..... 392
Rogers Pass tunnel work. Tracy....*411, (n) 94
Rogers, T. C. Submerged orifices and tubes.*825
Roller-crest dam, Grand River. Teichman *1, Ed. *60
Roller, Finley's multiple-disk road.....(n)*964
Roller shapes paving along track, Interstate bridge, Portland, Ore.....*559
Roller shoe for bridge, Pittsburgh....*647, *1034
Rolling mills, Unaflow engines for.....(n) 288
Rolling stock, Life of railway—N. Y., N. H. & H. statement .....(n) 831
Roof-arch collapse, Atlanta rink *70, Reputation poor bracing for roof 83, Dangerous timber roofs due to incompetence. Dewell.*515
Roof-arch collapse, Cleveland filter *186, (ns) 141, 1009
Roof, Cantilever grandstand, with tension in posts, Salt Lake Cy. base-ball field.....*707
Roof, Cement-tile, of car-repair shed.....*474
Roof, Peaked concrete, New Bancroft Hotel, Saginaw, Structural design. Jensen.....*372
Roof-slabs, Gypsum, of 10-ft. span, Walker Bldg., Racine *1173
Roofing, Cement-tile, Crane and Packard plants *154
Root cutter, Buffalo sewer cleaner and...(n)*532
Rope slings, Safe loads on. Salmon.....*1183
Rose sand and gravel plant.....*470
Roughening concrete floor for resurfacing, Balboa dry-dock. Hirschberg.....*755
Roughing tool, Gardner sidewalk (ns) 288, *628
Roumania—Cernavoda bridge *861
Roxbury, Mass.—School-shop floor failure. Thompson *262. Wolf, Von Mueller..... 614
Ruggles, S. L. Vocational guidance..... 713
Running, T. R. Weir formulas.....*695
Russia, Prospects for railway building—Am.-Russian Chamber of Commerce..... 177
Rutenberg's concrete dam.....*788

S

Sacramento, Calif.—Replanning and redistricting *444, Weir .....(errata n) 225
Safe grade crossings—Calif. R R. Comm..*1185
Safety-first switchboard, G. E.....(n)*1204
Safety—Holmes Asso. and award..(ns) 722, 1009
Safety scaffolding—Placing putlogs (n) *176, Mason's horse .....(n)*176
St. John dist. levee work.....*158

ST. LOUIS, MO., CITY AND COUNTY
—Bridge, Completing municipal....*1129, *1230
—City replanning 188, May spend $8,000,000.1151
—Drafting room, Dept. Pub. Wks.....*128
—Electric-light plant, Municipal....(n) 237, 876
—Engineers' Club paper 989
—Garbage collectors' strike ended.....(n) 141
—Lamp posts, Traffic-signal.....(n)*224
—Municipal dock, New.....*1216
—Paving specification changes..... 58
—River terminals projected—Bowen's report 216
—Road bonds valid, County.....(ns) 188, 1202
—Sewer-sheetpile driving *658
—Sewer-tile laying in cold weather.....(n) 660
—Sewer tunnel, Mill Creek—Alignment survey. Gans *410, Materals chuted through drill holes to mixer. Horner.....*705
—Sewers, Brick and tile, cracked under same loading *557
—Sewers, First tile, compared to brick. Moreell *1024
—Traffic-census methods and results. Holen.*832
—United Rys. street-ry. track without spikes of bolts *1217
—United Rys. taxation dispute.....(n)1057
—Water filters and typhoid. Potter.....1047
—Water-meter slide rule.....*800

ST. PAUL, MINN.
—Harbor changes by Govt..... 332
—Ice, Artificial, competes with natural..(n) 73
—Miss. Riv. channel change proposed....(n) 977
—Paving by force account.....(n) 900
—Road-oiler operating cost, Motor.....(n) 274
—Sewer sheetpiling, Pulling.....(n)*175
—Sewer trenching, Steam-shovel.....(n)*128
—Street elevated to retain Koppers coke plant 477
—Street-sprinkling statistics .....(n) 273
—Union-station plans.....(ns) 865, 914
—Water-supply copper-sulphate treatment. Huff 104

St. Tammany Parish, La., highways. Huckaby *544
Salamanca, N. Y.—Bridges....*266, *316, *338
Salesmanship, Engineers and. Lowry....(n)1165
Salmon, F. W. Waterproofing drawings 1037, Safe loads on rope slings.....*1183
Salt Lake Cy., Utah—Concrete hydrant and valve chambers *66, Gantry cranes work on sewer *97

Page

Salt mines cause subsidences.....(n)1085
Salt River Project—Cross Cut power station. Gaylord 86, Mowing-machine work.....(n) 364
Salt water causes cracking reinforced concrete, Philippines 1047
Salvador, Projected railway in. Blackford (n) 137
Sampson, F. W. Creeping and heaving of concrete-road slabs 134, 369
San Antonio, Tex.—Sewage disposal by broad irrigation. Bartlett *586, Curb inlet..(n)*1042

SAN DIEGO CITY AND COUNTY, CALIF.
—Automobile operating cost.....(n) 809
—Dam, Plan to raise Morena.....*1112
—Dam, Rebuilding lower Otay; bond election .....(n) 1057, 1106
—Dams, Two new water-supply..... 231
—Pumping plant, Salvaging flooded.....*125
—Pumping system, Restoring flood-wrecked well and *980
—Shops, Municipal. Lockwood.....*548
—Water clarifying .....(n) 189
—Water main, Anchoring submarine.....(n) 852

SAN FRANCISCO, CALIF.
See also "Exposition, Panama-Pac."
—Bridge across bay.....*426, (n) 141
—Cable system, Dump-wagon. Owen.....*272
—Garbage burial proposed.....1104
—Hetch-Hetchy dam site.....*137
—Park plans, Exposition site.....(n) 818
—Shore protection nearing completion.....*543
—Surveys, Loose-leaf filing system for. Owen.*346
—Twin Peaks Boulevard.....*504
—Twin Peaks tunnel methods. Cleary.....*636

Sand, Albany engineers discuss..... 949
Sand and gravel plant, Rose.....*470
Sand dredge, Hydraulic hopper.....*1211
Sand, Drifting, water filters, Toronto 561, *566, (n) 464, Water lifts sand to filters from cars. Gore *803, Mechanical agitation unsuccessful. Nordell..... 856
Sand, Filter, washing device.....*449
Sand-spreading device for filling asphalt-block joints .....(n)*1142
Sands, E. E. Activated sludge..... 109
Sandy Ridge tunnel.....*899, *936
Sanitary Asso., N. J.....(n)1156
Sanitary problems, Chemists and engineers talk on 673
Sanitary topics before Am. Pub. Health Asso. 831, 858, 859, 955, Proposed code for sanitary control of waterways.....876, 901
Sanitation. See also "Sewers," "Water pollution and purification," "Infantile paralysis," "Typhoid."
Sanitation on watersheds..... 813
Sanitation, Rockefeller Foundation's school of, at Johns Hopkins..... 131
Santa Monica, Calif.—Retaining wall *173, Buys water-wks. (n) 577, Paving bids in competition with contractors.....(n) 577
"Sausages" for river protection, Jamaica uses. Park 468
Savannah, Ga.—Incinerator costs.....(n) 267
Saville, C. M. Water-supply preparedness 85, Hartford water case..... 246
Saville, T. Rainfall interpreted.....*1208
Sawmill, Pennichuck Water Co.'s.....*472
Sawyer, W. H. Saving canal walls.....*556
Scaffolds, Travelers Ins. Co.'s points on—Placing putlogs (n) *176, Mason's horse, (n)*176
Schenectady, N. Y.—Dam failure.....*817
Schiefer, H. V. Automatic skip.....*590
Schnellbach, J. F. Activated sludge.....*972
School. See also "Engineering schools," "Education."
School-building plans, N. E. A. standard..(n) 817
School, Huntington high, design.....*763
School-shop floor failure, Roxbury....*262, 614
Schwab, C. M. Steel production and business properity 1237
Schwada, J. P. Arch-crown thickness.....*1012
Scour valve, Replacing reservoir, N. S. W. Kendall *173
Scows for floating Que. bridge span *420, *522
Scranton, Penn.—Mine cave-ins 276, *280, Building foundations 150 ft. under armory *681
Scrapers, Half-hour performance of Baker 4-wheel, Ohio roads..... 32
Screed with plow handles, Concrete....(n)*1236
Scrapers, Wheeled, for levees.....*158
Screens wanted, Water-intake.....(n) 664
Screw propellers, Power loss in, due to rough surface. McEntee 1173
Screw sockets, Tenax expansion.....(n)*1012
Sea wall, Longport, N. J.....(n) 382
Sea wall, San Francisco.....*543
Seaboard Byproduct Coke plant.....*688
Seat-stand collapse, Colo. Springs.....(n)*578
Seatless rapid-transit cars, London.....1128
Seattle, Wash.—Water for a million people 42, Flat-slab test. Turner 84, Lord 85, Godfrey 279
Section corners, Designating. Rankin....(n)*560
Security Cement & Lime plant.....*1222
Security Mutual Life Ins. Bldg. reconstruction, Lincoln, Neb. *778
Sedgwick, W. T. Water refining..... 513
Seelye, T. E. Drift catcher.....*795
Seneca Falls, N. Y.—Power plants and factories moved *145
Septic tank. See also "Imhoff," "Sewers."
Septic tank, Dr. Travis and 225, Roechling... 809
Septic-tank patent ended .....663, (ns) 141, 866
Septic tanks, Vitrified-pipe, Dickey filter for use with .....(n) 144

Page

Seros development—Draft-tubes *76
Service pipes—N. E. Water-Wks. Asso. report 594
Service standard, Gas calorific-value, Second Dist., N. Y.....(n) 818
Sevier Bridge dam, Utah.....*398

SEWERS, SEWAGE, SEWERAGE
—Activated sludge, Am. Soc. Mun. Imprvts. on 767
—Activated-sludge experiments, Univ. of Ill.; plant at Champaign, etc. Bartow, Mohlman, Schnellbach *972, Air diffusion 110
fusion 110
—Activated sludge in India..... (n)*624
—Activated-sludge patent correspondence requested ..... (n) 617
—Activated-sludge plant, Hermosa Beach, Calif. 380, Novelties—Air-diffuser wheel, etc. Brosius *890
—Activated-sludge plant, Milwaukee *686, 107, 856
—Activated-sludge progress 366
—Activated-sludge results reviewed, Cleveland. Pratt, Gascoigne.*1061, *1124, (n) 110
—Activated-sludge tanks, Air-diffuser experiences with; porous-block and perforated-pipe diffusers; clogging—Baltimore; Milwaukee; Brooklyn; Chicago; Houston; Cleveland; Armour & Co.; Ill. Water Survey 106, Baltimore..... 267
—Albany sewage pump house and grit chamber, Building. Vernon.....*738
—Am. Pub. Health Asso. reports 858, Sewerage terms 858, 955, State board of health control of sewage works—Table 859, Code 876, 901
—Baltimore Imhoff tank foams. Potts..... 469
—Baltimore sewerage-system completion—Treatment works; Jones Fallsway. Requardt *736
—Binghamton, N. Y., builds interceptor with four river crossings. LaRoche.....*1227
—Brick, Los Angeles Co.'s "Frost" radial interlocking ..... (n)*1248
—Bronx Val. sewage purification.....(n) 530
—Buenos Aires slaughter-house sewage test plant. Coulter 837
—Buffalo—L. V. passenger terminal over drainage channel. Hurlbut.....*436
—Buffalo, etc., sewage disposal.....(n)1202
—Butte—Pipelaying with port. derrick (n)*364
—Catchbasins and inlet. Pueblo..*77, (n) 224
—Chicago—Sewage treatment and dilution 1056, Effect of sewer gas on concrete stockyards sewer. Brooks *486, 511, Stockyard sewers, new and old 487, Bubbly Creek will bubble no more *725, Sewage dilution hit by Army report and Sergel's address 1151, Drainage-canals flow limitation (n) 93, Joliet dam power bids (n) 237, Specifying progress, Calumet intercepting sewer (n) 364, Pollution of water-supply (n) 430, Packing-house and stockyards refuse disposal.... (ns) 427, 1202
—Cleaning machine and root cutter, Buffalo 2-way ..... (n)*532
—Cleburne, Tex., Imhoff tanks and sprinkling filters. McDonnell.....*1028
—Clinton, Ia.—Hollow-tile sewers.....*634
—Coal dumped in Boston sewer.....(n)1057
—Code for sanitary control of waterways, Proposed, Am. Pub. Health Asso. 876, 901
—Cook Co., Ill., institutions sewage-treatment plant—Imhoff tank, etc. Ashley..*296
—Council Bluffs large catchbasin inlet..(n) *32
—Davenport, Ia., disposal; water purification safer than sewage treatment; Alvord's views 1237
—Decatur and Elmhurst electrolytic sewage tests. Shields.....370, (ns) 578, 674
—Definitions of sewerage and disposal terms 858, Phelps 955
—Detroit sewer construction criticized by Bureau of Governmental Research.....1149
—Durant, Okla., electrolytic sewage-treat-
—Detroit report—Engineers' pay.....1189
—Drain entrances, Ill. farm.....*209
ment tests; bacterial results.....*547
—Filter for use with vitrified-pipe septic tanks, Dickey .....(n) 144
—Fishy sewage-treatment scheme—Tannery wastes. Observer 855
—Florence, S. C., sand-clay sheet surfacing from sewer trenches. Mamitt.....*752
—Great Bend, Kan.—Cleaning outfall sewer of quicksand .....(n) 464
—Kansas experience in running small sewage works. Veatch..... 64
—Imhoff-tank patents. Miller.....1239
—Lakewood, O., sewage works and outfall; Imhoff tanks, etc.....*793
—Lexington, Ky.—U. S. Pub. Health Service as consulting engineers 37, Norcross..... 180
—Lima, O.—Reinsch-Wurl screens and activated-sludge tanks recommended.....(n) 46
—London activated-sludge expts.....(n) 37
—Luton, Eng., hydrolytic sewage tanks. Tomlinson *193, 225, Roechling..... 809
—Lynn, Mass., sewage disposal.....(n) 530
—Matawan, N. J., activated sludge.....(n) 140
—Milwaukee, Activated sludge *686, Hatton, 107, Nitrogen from plain and activated sludge. Copeland 665, Ed. 663, Fuller, 667, Mechanical agitation expts. Nordell 856
—Milwaukee intercepting sewers, Surveying for. Townsend *1232, Contractor's compressed-air regulations .....(n)1236
—N. Y. Cy.—Brooklyn adds automatic sewage-pumping station. Gersoni.....*810

Page

SEWERS, SEWAGE, SEWERAGE—Continued
—N. Y. Cy.—Long-time rainfall basis for sewer design. Hufeland.....*393, *450
—N. Y. Cy.—Report on Elmhurst disposal plant; electrolytic tests 91, Shields..... 370
—N. Y. subway, inverted siphons under. Bleich *442
—Phila.—Regular inspection part of maintenance. Connell 17, Most sewers new. Datesman 181
—Pipe-joint compound, "Superior".....(n) 288
—Rochester, N. Y., sewer tunnel in rock. Raymond *885
—St. Louis—Mill Creek sewer-tunnel alignment survey. Gans *410, Materials chuted through drill holes to mixer. Horner *705, Brick and tile sewers cracked under same loading *557, Sheetpile driving *658, First tile sewers compared to brick. Morcell *1024, Laying tiles in cold weather .....(n) 660
—St. Paul—Steam-shovel trenching (n) *128, Pulling sheetpiling.....(n)*175
—Salt Lake Cy.—Gantry-crane work..... *97
—San Antonio—Sewage disposal by broad irrigation. Bartlett *586, Curb inlet. (n)*1042
—Sense or sentiment to govern sewage treatment—Dallyn's remarks before A. S. M. I. Purity of effluent; typhoid transmission by cattle. Potter..... 855
—Septic tank, Dr. Travis and 225, Roechling. 809
—Septic-tank patent, Cameron, 663, (ns) 141, 866
—Sewage ejector, Yeomans motor-driven..(n) 288
—Vitrified-pipe sewers, Aids to estimating cost of. Kirchoffer.....*780
—Water consumers, Making them pay for sewer service—Earl's report, New Orleans 512, Charging for use of sewers, Manila and Honolulu. Gideon.....1193
—Wayne, Penn., disposal works after nine years. Hill.....*1163
—Wildwood, N. J., Screening and disinfecting sewage *1243

Shaft sinking by dredging through springs and gas, for Cleveland water tunnel under Cuyahoga River; drop under pig-iron loading, etc.....*374, *1220
Shaw, A. M. Night and day work..... 606
Sheahan's daily cost records.....*897
Shed, Car-repair, with cement-tile roof....*474
Sheetpiling. See "Piles."
Sherman, L. K. Engineers in politics.....1145
Sherrill, C. O. Combination of plane table and transit for photography..... 905
Shields, W. S. Electrolytic sewage tests at Decatur and Elmhurst.....370, (n) 578, 674
Ship. See also "Boat," "Dredge," "War."
Ship—Cargo-handling equipment, Italian freight steamer "Milazzo".....*210
Ship, Electric battle, "Tennessee".....(n) 279
Ship load-line and bulkhead rules.....(n) 674
Ship—Steamer-deck fireproofing.....(n) 375
Ship "Surveyor," U. S. Coast Surv.....*235, *812
Shipbuilding development, U. S.....(n)1057
Ships around world via Canal.....(n) 585
Ships for lake and ocean practicable? Coutlee 713, Evans.....*604
Ships, Geared turbines for naval.....(n) 818
Ships, Los Angeles municipal.....(n) 914
Ships—Power loss in screw propellers due to rough surface. McEntee.....1173
Ships, Steam turbines for..... 807
Shop, Concrete, Panama. Hardman.....*1166
Shop-wagon for water meters.....*447
Shops, Municipal, San Diego. Lockwood....*548
Shore protection. See "Coast erosion."
Shores, Roos' adjustable building.....(n)*1186
Shovel at Rose sand plant.....*470
Shovel, Mired, that lifts itself.....(n) *1236
Shovel, Revolving steam, sewer trenching, St. Paul .....(n)*128
Shovel strikes bridge, Cleveland.....(n)*274
Shovel work. See also "Earthwork."
Shovel work, Steam, So. Ry.....*1079
Shovels, Power, Digging end of..... 172
Showalter, D. N. Scouting for water power.. 389
Shrewsbury, Mass.—Pumping station, *433, (n) 616
Shrinkage cracks—Joint adhesion.....(n)*1235
Shriver, K. H. Placing wood coffer-dams without driving.....*1140
Sidewalk-roughing tool, Gardner...(ns) 288, *628
Sierra Nevadas, Building multiple-arch dams in *1157
Sighting box, Illuminated.....*657
Sign, Ill. prize road-direction.....(n)*1092
Signal color scheme changed, P. RR.....(n) 285
Signal, Traffic, lamp posts, St. Louis.....(n)*224
Signal, Union grade-crossing.....(n)*1204
Signals, Crossing, N. Y., N. H. & H.....(n) 419
Signals, Position-light, P. R.R. *877, (errata n)1193
Signals, Standard crossing warning..... 285
Signs, Miscellaneous street. Wallis..... *16
Silent. Salvaging flooded pumping plant....*125
Simons, S. C. Garbage and refuse disposal, Los Angeles.....*677
Sioux Cy., Ia.—Concrete pavements *165, 226, (n)*274, Johnson 830, Dished concrete roads *214, Booster pumping station for water-supply to a suburb.....1017
Sioux Falls, S. D. Water-Wks. impvts.....*840
Siphon, Connecting Narrows, to Staten Isl. main *782
Siphon, Inverted, on suction pipe, Des Moines, Kastberg .....(n)1091

Page

Siphon-operated ram. Palmer.....*164
Siphons, Inverted sewer, under N. Y. subway. Bleich *442
Skip, Automatic, handles hot ore. Schiefer..*590
Skyscraper, Altering columns of 21-story...*1170
Slab-and-beam floor cracked by settlement, Load test of. Byrd..... *11
Slab-deck concrete bridge over highway, Rock. I. Lines.....*1002
Slab, Distribution of load and moment to beams supporting rectangular concrete..(n) 464
Slab, Flat, floor failure due to poor brick wall columns, Roxbury school shop. Thompson *262, Careful design needed for wall-bearing flat slabs. Wolf, Von Mueller 614
Slab-floor pat. decisions, Turner.....720, 769
Slab-revetment machine, concrete, for Miss. Markham *1070, 1094
Slabs, Concrete, St. Louis bridge.....*1230
Slabs, Flat—Seattle test. Turner 84, Many unbiased tests. Lord 85, Godfrey..... 279
Slabs, Gypsum roof, of 10-ft. span, Walker Mfg. bldg., Racine.....*1173
Slabs, Wabash grade-crossing deck, Ft. Wayne *241, Heavy concrete slabs make good railway bridges..... 277
Slag cement permitted, New Orleans.....(n) 770
Slaughter-house sewage test plant, Buenos Aires. Coulter..... 837
Sledding large steel pipe.....(n) *32
Sleight, R. B. Irrigation field laboratory...*1080
Slide rule for regearing water meters, Bock's, St. Louis.....*800
Slide rule, Hydraulic, Twin-pipe problem solved by. Hazen..... 85
Slides, Earth. See "Earthslides."
Slings, Safe loads on rope. Salmon.....*1183
Slipperiness test pavements, Mass.....1162, *1141
Smith, E. B. Soil-pressure test device, *339, (n) 616
Smith, F. P. Sheet-asphalt tests.....205, 416
Smith, T. L. Submerged orifices and tubes..*825
Smith, W. F. Kensico dam quarries.....*250
Smithsonian Inst., Correction from.....(n) 371
Smoke Prevention convention.....673, (n) 287
Snow, Ladder dredge for, Chilean Trans-Andean Ry.....(n) 843
Snow, Melted, supplies arid district, Ariz., *435, 467
Snowshed fires, Spotting, So. Pac.....*458
Society for Promotion of Engineering Education—Statistics .....(n) 139
Society of Naval Architects.....*1113, 1173, 1188
Soil-pressure test device, U. S. Dept. Ag., *339, (erratum n) 616
Soil tests, P. R.R. freight station, Chi..... 801
Soils, Testing, for drainage properties, U. S. Dept. Ag. Haswell.....*211
Soldering iron, Clemens electrical.....(n)1156
Solenoid-control relay, G. E.....(n)*580
Sound-absorbing stone, Johns-Manville "Akoustolith" .....(n)1108
Sound—Outdoor acoustics..... 178
South America, To study chances for construction material in.....(n) 440
South Am. trade development.....1197
Southern Calif. Edison Co.....1200
Southern Power Co.'s reservoirs.....(n) 138
Southwestern Engineering Soc.....(n)1107
Spaander, J. Paved wheelways in Holland, *714, Draining No. Holland *773, Engineers in politics.....1145
Spanish turbine-plant draft-tubes..... *76
Sparrows Pt., Md., New city.....(n) 381
Spaulding dam to be raised. Mudgett.....*328
Specifications. See also special topics.
Specifications—A. S. T. M. reports..... 38
Specifications, Modernizing Naval..... 512
Spike, New track A. R. E. A.....*1215
Splices, Strength of clamp, in reinforcement. Lasier 135
Spokane, Wash.—Asphalt-pavement costs with municipal plant. Cunningham..... 375
Springfield, Mass.—Intermittent excess coagulant. Lochridge 617, Municipal week, 1046, 1053, 1054
Springs, Truck, save pavements. Claussen... 904
Sprinkler, Buffalo hand pressure.....(n)*532
Sprinklers, Valve for dry-pipe, Natl. Fire Ext. Co.'s.....(n) 240
Sprinkling filters, Cleburne. McDonnell....*1028
Sprinkling streets from trolley cars, Worcester *1205
Stack. See also "Chimney."
Stack falling from broken boom tests concrete floor, Portland, Ore. Blood.....*618, (n) 530
Stacks, Wrecking steel, Chi.....*1040, 1045
Stackers and conveyors, Jeffrey.....(n)*1108
Stair tread, American Mason safety.....(n) *48
Stairway, Concrete cantilever, Phila.....(n)*950
Standpipe. See "Tanks and standpipes."
State board of health control of sewage works —Table 859
State ownership on B. & M., Try..... 467
Staten Isl. main, Connecting Narrows siphon to *782
Station platform shelters, Los Angeles..... *73
Statue of Liberty, Lighting.....(n)1057
Steam. See also "Boiler," "Engines," "Turbines," "Condenser," "Hammer," "Shovel," etc.
Steam and gas power station, Ford combined 1085
Steamboat-deck fireproofing.....(n) 375
Steamer. See "Ship," etc.
Steamships around world via Canal.....(n) 585
Steel. See "Iron and steel."
Steere, S. O. Salamanca bridge work..*316, *338
Steps, Manhole and catchbasin.....(n) 224
Stern, E. W. Motor trucks and pavements... 938

Page

Stettler's X-ray photos. of concrete..... 563
Stevens, J. C. Rectangular wooden flumes..*1160
Stirrup-spacing diagrams for concrete beams. Bailey *694
Stockyards, Chi.—Activated sludge 109, 110, Effect of sewer gas on concrete sewer *486, 511, Bubbly Creek's abolition *725, New and old sewers 487, Refuse disposal; sewerage .....(ns) 427, 1202
Stockyards — Slaughter-house sewage-test plant, Buenos Aires..... 837
Stoker, Moloch underfeed.....(n)*1060
Stone. See also "Rock," "Quarry," "Earthwork," etc.
Stone, Crushed, is dutiable.....(n) 770
Stone masonry and concrete, Old battle between—P. R.R. stone-bridge repair 131, Cheap stone-arch highway bridge. Fletcher.*368
Stone, Sound-absorbing, Johns-Manville "Akoustolith" .....(n)1108
Stone waste, Centrifugal pumps dispose of...*508
Stoney gates, Tallassee Power Co.....*921
Store window, Store Impvt. Co.'s non-reflecting .....(n)*916
Storm. See also "Rainfall."
Storm cripples Kankakee Riv. bridge. Older..*638
Storm damages Texas coast (n) 429, Effect on Corpus Christi viaduct.....*815
Storm King road, Building.....*596
Storms—Southern and W. Va. floods, bridge destruction, etc. 140, *183, *232, 321, 331, *360, 381, *428, *490, *924, (ns) 429, *560, 756, Southern rainfall exhibited by charts. Henry *886, Heavy rainfalls elsewhere compared. Allen.....1001
—Contractor discusses bridges damaged by floods 1233

Strachan, R. C. Plotting catenary.....1046
Straightening Harrisburg bridge I-beams, *385, *761
Strawberry tunnel surveying. Hammond...*1086
Stream. See "Rivers," "Flood," etc.
Street railway. See "Electric railways," "Elevated," "Subways," "Cable."

STREETS
See also "Pavements," "Roads," "Garbage," "Curb inlet," etc.
—Astoria—Viaduct vs. fill. McClean..... 325
—Baltimore—Jones Falls way.....*736
—Charlotte, N. C., work under tent 175, Finishing concrete *803, Sheet-steel paving..*946
—Duluth replanning. Patten.....*645
—Excavator and wagon loader, Koehring, for street grading, Chi.....*495
—Florence, S. C., Sand-clay street surfacing from sewer trenches. Mamitt *752, Expanding concrete breaks curbs.....(n)*708
—Flushing streets with portable water mains Baker, Ore., and Buffalo Mun. Equip. Co.'s devices *659
—Kan. Cy., Mo.—Slides in deep cut.....1171
—Los Angeles excess condemnation *20, Grade checks at railroad street crossings 462
—Middleboro, Ky., street-intersection problem —Paving-cost assessment.....*801
—New Orleans paving and repair work..(n)1202
—N. Y. Cy. (See also "Pavements")—Street-cleaning report..... 227
—Paving, Computing, outside of curved curbing. Lewis.....*463
—Phila. Highways report—Sewer inspection, 17, 181, Bituminous-material inspection.. 27
—Pueblo corner inlet, catchbasin, curbing, etc. *77, (n) 224, Railway street crossing, (n)*464
—St. Louis traffic census. Holden.....*832
—St. Paul provides elevated street to retain Koppers coke plant 477, Sprinkling statistics .....(n) 273
—San Francisco—Loose-leaf filing system for surveys. Owen.....*346
—Signs, Miscellaneous. Wallis..... *16
—Sprinkler, Buffalo hand pressure.....(n)*532
—Street Cleaning Soc. meets..... 770
—Street dirt and cleaning not measurably unhealthful—Am. Pub. Health Asso..... 831
—Toronto—Streets with two driveways and central footwalk.....(n) 873
—Traffic, Heaviest—Fifth Ave., N. Y. Stern, (n) 597, Chicago. Brodd 761, London. Strobel 905
—Worcester, Mass.—Flushing streets from trolley cars *1205

STRESSES
See also "Test."
—Arch-crown thickness formula. Schwada..*880
—Beams supporting rectangular concrete slab. Distribution of load and moment to..(n) 464
—Bridge leans to side, Extensograph shows that *1102
—Bridge loads, Motor-truck. Childs.....*898
—Bridge rocker casting, Que. *650, 661, Bilderbeck, Witmer, Keast 760, Baird, Anon., Foulds *857, *1191
—Bridge-strut tests, Bureau of Standards *49, 81
—Bronze, Detecting initial stress in. Miller..1147
—Concrete footing offsets, Bond and shear in—Ill. Highway Dept. rule. Older, *18, (errata n) 325
—Eccentric loading on rectangular areas, Charts for Cotten.....*1090
—Moment of inertia of lenticular section. Vetter *995
—Rope-sling safe loads. Salmon.....*1183
—Timber, Unit stresses for, Natl. Lumber Mfrs.' Asso..... 273

Page

Strike. See "Labor."
Strobel, C. L. Street traffic..... 905
Struckmann, H. Cement from oyster shells..*230

STRUCTURAL WORK
See generally specific topics, such as "Bridges."
—Balcony brackets, Taking care of eccentric loads from, Huntington high school.....*763
—Building, Placing steel frame in old wall-bearing, Lincoln, Neb.....*778
—Cost, Items affecting. Pitman, Danforth..1169
—Derricks, Tower, for erecting frames.....*802
—Que. bridge *298, 321, *349, *420, 468, 517, *522, Suspended span collapses 513, *524, 561, 563, *572, 575, 622, *650, 661, 709, 760, *857, *1191, (n) 664
—Riverside Drive viaduct, N. Y., Jacking up; buckling columns.....*869
—Rivets, Countersunk. Fleming..... 496
—Roof, Cantilever grandstand, with tension in posts, Salt Lake Cy.....*707

Stubbs' "Vitrolithic" concrete paving.....*1120
Students. See "Engineering schools," "Education," "Competition," "Engineers."
Stump pullers, Hand- and horsepower.....*223

SUBWAYS
See also "Tunnels."
—Chi. rapid-transit plans; map.....1104, *1148
—Memphis grade-crossing elimination.....*160
—New York City:
Cost of Centre St. Loop $10,843,586 per mile.....(n)1041
East Riv. tunnel blowout; prevention.....*728
East Riv. tunnel surveys. Holland.....*655
East Riv. tunnel, 60th St., Low bids..... 132
East Riv. tunnels, Progress on..(ns) 963, 1106
Rock-tunneling machine, App.....*340, 365
Sewer siphons, Inverted, under subway. Bleich.....*442
Steelwork kept 20 ft. behind heading. Fried *949
Timbering collapse, Brooklyn; trolley car falls in.....(n) 140
Wagons, Snatching, out of pits. Fouhy....*124
—Sydney, N. S. W., subway.....(n) 286

Suction pipe, Steadying. Brown.....*1185
Sullivan, J. G. Can. engineers and alien appointments..... 855
Sulphate-of-alumina manufacture, English municipal..... 261
Sunday, Shutting down cement kilns on. Brown.....(n)1197
Sundry Civil Appropriation bill.....(n) 142

SURVEYS AND SURVEYING
See also "City planning."
—Azimuth, Field-book sheet for, McClintock's, of Union Pac. R.R. *363, Simple azimuth determinations. Finch..... 1139
—Croton watershed area, Correcting. Brush 576, Wegman, Vermeule..... 664
—Dam sites, Surveying, in Grand Canyon, Colo. River, by Girand.*306, (erratum n) 371
—Foresight for accurate work. Gansmann, (n)*660
—Four-sided areas, Calculating. Averill..*1186
—Instrument rack for field office. Brett (n) *80
—Leveling, Bubble-reading mirror source of error in, Alaska Ry. Bevier.....*1037
—Los Angeles geodetic survey.....(n) 660
—Mass. city boards of survey..... 189
—Monuments, Houston, Tex. McVea....(n)*364
—Notes, Loose-leaf, Ogden, Utah.....(n)*320
—Ohio topographical-survey completion (n)1105
—Photogrammetry for taking topography of watershed, Canada; plotting machine, etc. Nelles.....*878
—Plane table and transit, Combination of, for topography; Duck Valley project. Johnson *488, Sherrill..... 905
—Plumb-bob suspension, Scranton.....*684
—Plumb-line reflector.....(n) 412
—Portland, Ore., precise-level survey; permanent benchmarks. Hardesty..... *55
—Railroad valuation surveys may be made useful. Dunlap..... 36
—Railway curves measured on arc or chord. Raymond 86, Kitts 324, Table of chords. West.....(n)1186
—"Railway curves, Reforming." Lavis..... 468
—Range finder and clinometer. Young.....*1183
—Retracing old survey to settle Ohio-Mich. boundary dispute.....*1234
—River survey, Ore. State Engineer's, guides water adjudicators. Cupper..... 5
—Rochester sewer tunnel. Raymond.....*883
—San Francisco—Loose-leaf filing system for surveys. Owen.....*346
—Section corners, Designating. Rankin..(n)*560
—Sewer-tunnel alignment survey, Mill Creek, St. Louis; plumbing holes drilled from surface; surface monument; plumbing device, etc. Gans.....*410
—Sewer tunnel in rock, Unlined, Rochester. Raymond.....*883
—Sewers, Surveying for Milwaukee intercepting; loose-leaf field notes. Townsend..*1232
—Texas, Land surveying in. Howe *753, Creuzbaur..... 954
—Tunnel, Milwaukee Shore, survey routine; illuminated sighting box.....*857
—Tunnel-survey methods, Strawberry. Hammond.....*1086
—Tunnel surveying by string where transit failed, Boston. Plimpton.....1141

Page

SURVEYS AND SURVEYING—Continued
—Tunnel surveys, East Riv.—Surface work and plumbing; vernier roof scale; instrument platform; check measurements at shoves of shield, etc. Holland.....*655
—U. S. Coast & Geod. Survey—Peters' precise-leveling methods; mounting tripod on railway car. Bowie *74, Peters' precise-leveling record (n) 1041, 1159, Steamer "Surveyor" *235, *812, Precise level rod. Fischer.....*895
—U. S. Geol. Surv. topographic work...(n)1142

Susquehanna bridge, Cumberland Val. R.R. *385, *764
Susquehanna bridges, P. & R.—At Milton *509, *558, (n) *610, Harrisburg.....*703
Swan, Robert, Death of..... 768
Switch, Call ry., on Bklyn. R. T.....(n)*772
Switch, Twin Cy. "Dunn" safety split (n)*1156
Switchboard, G. E. safety-first.....(n)*1204
Switzerland, Ry. clearances in.....(n)1007
Sydney, N. S. W., subway.....(n) 286
Syracuse, N. Y.—Canal-bridge floor.....*545

T

Taintor gates, Tallassee Power Co.....*921
Talbott, H. M. Prorating paving cost..... *14
Tallassee Power Co. plant.....*917, 951
Tampers, Elec. track, on N. Y. Cent., and German machine discussed. Vaughan....*946
Tangent, Approx. expression for. Paaswell, (n) 364
Tangent of compound curve, Detefmining Beal.....*993

TANKS AND STANDPIPES
See also "Septic," "Imhoff," "Sewers."
—Boston—Bellvue artistic tank.....*434
—Combination standpipes and elevated water tanks built by Chi. Bridge & Iron Wks. for Ricker & Sons, South Poland, Me., and Am. Can. Co., Maywood, Ill.....*692
—Concrete reservoirs built without forms, with cement gun, Cary and Elmhurst, Ill.....*894
—Electro-pneumatic outfit, Hill.....(n)*480
—Flour bag, Steel, as tank.....(n)*610
—Oil tanks, Repairing damaged.....(n)*510
—Wheaton, Ill., 6-post water-tower tank....*888

Tannery-waste treatment scheme..... 855
Tar for macadam roads. Ripley.....*1018
Tariff—Crushed stone dutiable.....(n) 770
Tax-limit results, Ohio cities..... 759
Taxation changes proposed, Pittsburgh...(n)1009
Taxation, St. Louis elec.-ry.....(n)1057
Technical journal, How the engineer should use the. Fleming..... 862
Technical societies, Should they try to influence legislation? Hess, Q. E. D. 278, Local sections..... 806
Technical societies. See also "Engineering societies" and societies by name.
Teele, R. P. Slow utilization of irrigation works.....*202
Teichman, F. Roller-crest dam, Grand Val. project *1, Ed. *60, Outlet control, Elephant Butte dam.....*1015
Telegraphy, Wireless. See "Wireless."
Telephone conduits, Trenching for long, Wis., with Pawling & Harnischfeger machine..*1068
Telephone lines, Beetle damages.....(n)1196
Temperature, Water flow increases with rising. Butcher.....*326, 611
Templet, Adjustable grade. Teddy.....(n)1092
"Tennessee," Electric Battleship.....(n) 279
Tent and bed outfit, Gosso portable.....(n)*432
Tent, Street work under, Charlotte, N. C..... 175
Terminal charges, U. S. waterways—Barge Canal study.....(n)1057
Terms. See "Nomenclature."
Terraces, Capitol, made waterproof.....*629
Test, Corrosion-resistance. Speller.....(n) 639
Test, Creosote-oil purity.....(n) 510
Test device, Soil-pressure, U. S. Dept. Ag., *339, (erratum n) 616
Test, Load, of concrete floor cracked by settlement. Byrd..... *11
Test of new type of concrete bridge for Minn. highways.....*620
Testing machines, Torsional-endurance and impact, Annapolis.....*283
Testing materials, Am. Soc. for—Activity at meeting 33, Meeting—Committee reports and papers—Specifications for cement, steel and other materials; meaning of "elastic limit," etc. 38, Cement specification adopted 35, 43, Meaning of "concrete" 81, Abstracts of papers—New facts about materials and methods of test—Cracking of brass tubes; saw-toothed stress-strain curves of bronze wire; strong aluminum bronze; hardness changes in hardening; water-quenched steel axle equal to oil-quenched; dangerous ferrite growth in low-carbon boiler tubes; proportional limit identical with elastic limit; measuring linseed-oil foots 87, Two ways of testing cloth; testing refractory firebrick; wear tests on concrete; strength of clamp splices in reinforcement; emulsification value of lubricating oil; proposed specification for concrete aggregate; finding specific gravity of aggregates; exponential hypothesis of fatigue *135, Morse's device for comparing tension and traverse tests of cast iron (n) 286, Meeting registrations, (n) 46

Page

Testing road-building materials, Cost of, N. Y. 455
Testing soils for drainage properties, U. S. Dept. Ag. Haswell.....*211
Tests, Brick and tile sewer, St. Louis *557, Comparisons.....*1024
Tests, Flat-slab, Seattle. Turner 84, Many unbiased tests. Lord 85, Godfrey..... 279
Tests for sheet asphalt, Bituminous-materials; A. S. M. I. specifications. Smith 205, 416, Forrest..... 209
Tests of joints in timber framing, at Panama-Pac. Expo. Dewell.....*111, *162, *796
Tests of large Metropolis bridge struts by Bureau of Standards reveal new facts..*49, 81
Tests, Pile, P. R.R. freight station, Chi.... 801
Texas—Roads *481, Land surveying. Howe *753, Creuzbaur 954, Coast storm-swept (n) 429, *815, Engineers discuss license law 864, Proposed highway commission.(n) 981
Texas Portland Cement mill.....*230
Thacher bridge patent decisions....44, 621, 661
Theater, Stratford, Phila.—Pouring girder..*506
Thomas, D. A. Bridge failure *455, Mich. omits joints in concrete pavements 609, Making most of Fed. road aid 795, Backfill wrecks concrete abutment.....(n)*804
Thomas transmission system.....(n) 253
Thompson, S. E. Roxbury floor failure.....*262
Thomson, Elihu, Medal for.....(n)1057
Thornell, J. B. Hydrated lime at Council Bluffs.....*456
Three-point problem solution. Higgins...(n)*610
Tidal flow affects artesian wells.....(n) 479
Tie-plates, Hooked, D., L. & W. *727, Nutlock.....(n)*1060
Tie-plates, St. Louis street ry.....*1217
Tie-plates, Wedge, for track under turntables, A. T. & S. F.....*571
Tie spacing, Roadmasters consider..... 623
Ties, Repairing narrow-gage steel.....(n) 950
Tile and brick sewers cracked under same loading, St. Louis *557, Comparison. Moreell *1024, Sheetpile driving *658, Laying tiles in cold weather.....(n) 660
Tile, "Fisk-lock" tapestry-brick building (n)*1248
Tile, Handle for carrying duct.....(n) 80
Tile, Hollow, sewers, Clinton, Ia.....*634
Tile roofing, Cement, Crane plant.....*154

TIMBER
See also "Pipe," "Piles," "Forest," "Pavements," "Flooring."
—Bridge, Mo. Riv., racked by creosoted-timber floor fire.....*670
—Creosote-oil purity, Spot test for. Cloukey, Murphy.....(n) 510
—Creosoted-timber report, Am. Ry. Bridge & Bldg. Asso..... 816
—Factory buildings, Cost of timber and concrete. Davidson. Natl. Lumber Mfrs.' Asso., Condron 884, McCullough 954, Ed. 1043, Muhlhausen.....1193
—Flumes, Rectangular wooden. Stevens....*1160
—Gray's Harbor mill-refuse burner.....*588
—Joints in timber framing, Tests of bolted and lagscrewed, at Panama-Pac. Expo., *111, *162, *796
—Pennichuck Water Co.'s forestry.....*472
—Stresses, Unit. Natl. Lumber Mfrs.' Asso. 273
—U. S. Lumber cut in 1915.....(n) 293
—Wood blocks, Are bleeding, really bleeding joints? Dutton.....*737

Time-penalty clause, Inaccurate estimate vitiates..... 53
Time, Standard, and daylight-saving movement.....1044, (n)1058
Toggle bolt, U. S. Exp. Bolt Co.'s "Arrow" "automatic".....(n)*532
Tomlinson, J. W. Hydrolytic sewage tanks, Luton, Eng.....*193, 225, 809
Tool holder, Jackson, Schmitz & Shanks balanced.....(n)*1156
Toronto, Ont.—Drifting-sand filters 561, *566, Water lifts sand *803, Hamilton concrete-road criticisms answered 911, Paraffin-wax coating for filter tanks and pipes (n) 464, Mechanical agitation discussed. Nordell 856, Streets with central walks.....(n) 873
Torsional endurance machine, Annapolis....*283
Tower derricks for erecting frames, P. R.R. freight station, Chi.....*802
Tower foundations, N. Y. Edison transmission-line.....*54
Tower tank, Six-post water, Wheaton.....*888
Towers, Erecting steel transmission, with gin-pole, by Milliken Bros. Allison.....*752
Towers, Erecting Canacao radio.....(n)*320
Towers, Material, Stability of.....(n) 75
Towne's, H. R., plan to prevent strikes on public utilities..... 757
Townsend, D. W. Surveying for Milwaukee intercepting sewers.....*1232
Tracing cloth, Defiance "Stirling" impvd..(n) 48
Track—Betts guard-rail holder.....(n)*1248
Track—D., L. & W. experimental rail fastenings *727, O. K. nut-lock.....(n)*1060
Track elevation. See "Grade-crossing elimination," "Railways."
Track filler and stretcher paving blocks, Nelsonville.....(n)*580
Track-grade templet. Adjustable.....(n)*1092
Track inspection by periscope, Queens elevated, N. Y. Cy.....(n)1186
Track, St. Louis street-ry., without spikes or bolts; tie-plates with lugs.....*1217

Page

Track questions before Roadmasters' Asso.—Seasonal distribution of work; anchoring track; tie spacing; elimination of slot spiking; equating track values; table of labor distribution 623
Track shifter for stripping Hill Annex mine, Rossman *1086
Track spike, New A. R. E. A. *1215
Track tampers. See "Tampers."
Track under turntables, Wedge tie-plates for, A., T. & S. F. *571
Track weeding, Chemical. Chipman 1047
Tracks, Concrete, for earth road. Warner *469, Brick wheelways in Holland. Spaander. *714
Tracks for heavy excavators on river diversion, Little Riv. drainage dist., Mo. *76, *344
Tracks, Sioux Cy. street-car—Concrete paving *167
Tractor. See "Motor vehicles."
Tracy, H. P. Enlarging Rogers Pass tunnel. *411
Trade, Am. engineers engaged in developing foreign 1197
Trade—Construction material for South Am., (n) 440
Trade prosperity and steel production 1237
Trade, U. S. foreign ..... (n) 491
Traders Paper Board plant appraisal *600
Traffic-census methods and results, St. Louis. Holden *832
Traffic, Heaviest street—N. Y. Cy. (n) 597, Chicago. Brodd 761, London. Strobel 905
Traffic routes, Lakes to seaboard. Evans *604, 713
Traffic, will it follow river impvt.? Wilkinson 985
Traffic-signal lamp posts, St. Louis. Holden, (n) *224
Train-shed, L. V., Buffalo, with columns between tracks *390
Tramway, Aerial. See "Cableway."
Transfer plate for muck-cars 1038
Transfers on through routes, Eliminating cost of 415
Transit and plane table, Combination of, for topography. Johnson *488, Sherrill 905
Transit commissioner for Pittsburgh (ns) 722, 912
Transmission tower. See "Tower."
Tratman, E. E. R. Whittemore's services .. 182
Trautwine, J. C., Jr. Phila. water rates 761
Traveler, Concreting. Magnolia cutoff *269
Traveler cranes, Quebec bridge *302
Travelers, First aid to highway 277
Traveling hoist, Shepard monorail ..... (n) *676
Travis, Dr., and septic tank 225, Roechling .. 809
Tread, American Mason safety ..... (n) *48
Trego, E. A. Creeping and heaving of concrete slabs 369
Tremie, Concrete in dry open caisson deposited by, Bear Lake, Utah *172, 178, *100
Trenching. See also "Earthwork," "Sewers," "Pipe."
Trenching for long telephone conduits, Wis., with Pawling & Harnischfeger machine ... *1068
Trenching machines, American, in European war. Miller 791
Tres Cruces dam repair. Bennett *1026
Trestle, Loading, for concreting Sandy Ridge tunnel *937
Trestle, Temporary, to complete Kan. Cy. bridge 529
Trestles, Dumping, So. Ry. ..... *948, (n) 1236
Triple expansion still ahead, Montreal 133, 835
Trolley car. See "Electric railways."
Troy, N. Y.—Lock and dam work. Watt *408, *492, *533, *609, 613
Truss, Howe, highway bridge with composite chord, Utah *559
Truss, Roof, collapse, Atlanta rink, etc. *70, 83, *515
Trussed Concrete Steel Co.'s portable buildings *585
Tube experiences, Detroit Edison plant. White. Cracking of brass condenser tubes and its cure 87, Dangerous ferrite growth in low-carbon boiler tubes 88
Tubes, Experiments with submerged orifices and. Rogers, Smith *825
Tunbridge Wells, Eng.—Lining wells *150

TUNNELS

See also "Subways."
—Blowouts in shield tunneling. Device to prevent—Diaphragm under clay. Leffingwell *728
—Boston Edison tunnel-face blowout 44, 285
—Cascade Mtns., Proposed 30-mile ry. tunnel under. Chittenden *928, 953, Walker, *1190
—Catskill Aqueduct, Tunnel grouting in Brooklyn end of. Myers *196
—Chicago Riv., Lowering st.-ry. tunnel under *968
—Clearances, Swiss railway ..... (n) 1007
—Cleveland water-intake tunnel—Cutting clay face with special knife *360, Transfer plate for muck-cars 1038, Divergence from line and grade (n) 382, Gas explosion, 187, 236, 380
—Cleveland water tunnel under Cuyahoga Riv.—Sinking shaft *374, Tunneling in firm clay wtih compressed air *1220
—Detroit old brick intake tunnel shows low Kutter factor. Maury, Horton *460
—Electric-cable tunnels, Chicago—N. E. L. A. report 633
—English Channel railway tunnel (ns) 430, 1058
—Goose Lake Val. system timber-lined tunnel, *504, 809
—Los Angeles street tunnel, Another ..... (n) 330
—Marseilles canal tunnel, world's largest .. *1013

Page

TUNNELS—Continued

Milwaukee Shore tunnel—Survey routine *657, Grouting with pumps. Warren *702, Concreting methods. Warren *794, Steel-lined material chute (n) *708, Economizing compressed air ..... (n) 1041
—Moffat tunnel financing ..... (n) 141
—New Orleans tunnel, To vote on (ns) 477, 626
—New York City:
Battery-tunnel blowout; prevention *728
East Riv., Four tunnels; Progress (n) 963, One holed through ..... (n) 1106
East Riv., 60th St., Low bids 132
Rock-tunneling machine, subway *340, 365
Surveys, East Riv. tunnel. Holland *655
Water-supply, 18-mi. rock tunnel for *1008
—Penn. R.R.'s Radebaugh tunnel repair, Greensburg, Penn.—Keeping progress record 124, Jacketing by mining methods *254, Costly maintenance work 276
—Pittsburgh tunnel will not be built ..... (n) 45
—Rochester, N. Y.—Water-tunnel driving *824, Unlined sewer tunnel in rock. Raymond *883
—Rock-tunneling machine, App. using rotating pneumatic-hammer tools, on subway work, Grand Central Terminal, N. Y., *340, 365
—Rogers Pass tunnel enlargement methods. Tracy ..... *411, (n) 94
—Sandy Ridge tunnel, Car., Clinchfield & O. Ry.—Close cross-sectioning widens clearance; steel forms *899, Lining with pneu mixer under traffic *936
—Sewer tunnel, Mill Creek, St. Louis—Alignment survey, Gans *410, Materials chuted through drill holes to mixer. Horner .. *705
—Survey methods, Strawberry tunnel. Hammond *1086
—Surveying tunnel by string where transit failed, Boston. Plimpton 1141
—Twin Peaks tunnel, S. F., methods and progress. Cleary *636
—Ventilating plants, B. & O. ..... (n) 261

Turbine blower, Wing, with novel lubrication, (n) *580

TURBINES, STEAM

—Chicago Commonwealth Edison has 45,000-hp. turbine *52, *1045
—Navy, Geared turbines in ..... (n) 818
—Pump, Montreal centrifugal. Gibson, Burford 133, Peterson 835
—Turbine at sea replaces reciprocating engine; Westinghouse-Macalpine gear 807
—Water-brake design. Herschel 378

TURBINES, WATER

See also "Water power."
—Brakes for turbine with Fink gates. Horton 181
—Cross Cut station, Salt Riv. Project. Gaylord 86
—Specific-speed diagram, Babcock's *707
—Yadkin plant, 31,000-hp. turbines for *924, 951, Removing runners without dismantling 920

Turner, C. A. P. Seattle test 84, Que bridge disaster 622, Decisions on his concrete-floor patents 720, 769
Turners Falls canal-lining slide *1031, 1046
Turntables, Drawbridge-type locomotive, 100 ft. long, A., T. & S. F. *828, Wedge tie-plates for track under them *571
Twin Peaks Boulevard *504
Twin Peaks tunnel methods. Cleary *636
Typhoid and water filters, St. Louis. Potter. 1047
Typhoid from water, accident 442
Typhoid, Indianapolis fails to protect citizens from 562
Typhoid reduced in Boston ..... (n) 674

U

Underpinning with hollow piles driven with point, Bklyn. Ed. Knight *982
Unemployed, Experiences with, on road rock breaking, Los Angeles. Martin 755
Union Water Power Co., Me.—Saving canal walls *556
United Engineering Societies building, Enlarging, for A. S. C. E. 425, Million dollars for library ..... (n) 1009
U. S. See also "Laws."
U. S. Army (See also "War")—Using engineers 36, Engineer Officers' Reserve Corps 92, 327, Pontoon bridges *156, Machinery-lubricating system used by engineers in river work *317, Concrete-revetment machine *1070, 1094, Opportunities for civilians to become engineer officers 615, Expanding Corps of Engineers (n) 530, West Point graduating class (n) 531, Engineer 2nd Lieutenants appointed ..... (n) 1202
U. S. Bureau of Commerce—Construction material for South Am. ..... (n) 440
U. S. Bureau of Fisheries' car ..... (n) 175
U. S. Bureau of Mines—Conservation 1144, Holmes Safety Asso. (ns) 722, 1009, Gasoline supply ..... (n) 839
U. S. Bureau of Public Buildings—Superseding Supervising Architect (n) 139, Plan abandoned with Buildings Appropriation bill ..... (n) 190
U. S. Bureau of Standards—Tests at Pittsburgh of large Metropolis bridge struts *49, 81, Steamboat-deck fireproofing (n) 375, Gasoline-measuring pump errors ..... (n) 840

Page

U. S. Capitol terraces made waterproof *629
U. S. Census—Slow utilization of irrigation works. Teele *202, Bulletin showing city debts (n) 46, Liquid-chlorine output (n) 437, Population of U. S. ..... (n) 1057
U. S. civil-service exam. for Junior Engineer. 1074
U. S. coal wealth and industrial supremacy—Brit. Asso. report *758
U. S. Coast & Geod. Survey—Precise-leveling methods—Mounting tripod on car. Bowie *74, (n) 1041, 1159, Steamer "Surveyor" *235, *812, Precise level rod. Fischer *895
U. S. Congressional railway investigation (n) 333
U. S. Dept. of Agriculture—Bulletin on Idaho irrigation 19, Soil-drainage tests. Haswell *211, New standard irrigation weir *222, Measuring flume *270, Soil-pressure test device *339, (erratum n) 616, Explosions in grain separators 563, Sensitive water-level recorder. Hoff *974, Irrigation field laboratory, Denver. Sleight *1080, Motor-vehicle statistics (n) 245, Appropriation for Public Roads and Rural Engineering Office (n) 333, Funds for roads in forest states 389, State road officials' conference 381, (n) 637, Rules for applying Federal aid 521, Computing cost of good roads ..... (n) 471
U. S. Dept. of Commerce — Load-line and bulkhead rules ..... (n) 674
U. S. Dept. of Public Works, Urging. Ripley 84
U. S. foreign trade ..... (n) 491
U. S. Forest Service—Lumber statistics (n) 293, Fish screens for irrigation ditches (n) 448, Power in forests ..... (n) 1200
U. S. Geological Survey—Paper on air-lift pumping, El Paso *204, Bulletin on lignite 178, Asphalt statistics *307, Tidal flow affects artesian wells (n) 479, Cement production (n) 46, Coal production (n) 169, Cement-industry operations (n) 286, Fuel-briquet production (n) 485, Coke-oven by-products production (n) 626, Iron-ore production (n) 785, Coal traffic (n) 1047, Artificial-gas production (n) 1172, Topographic work (n) 1142, Liquid-fuel supply 1189
U. S. Govt. industries, Accurate cost accounting for; armor plate 83
U. S. Govt. nitrate plant ..... 155, 415, (n) 190
U. S. Interstate Commerce Comm. See "Interstate."
U. S. mining-experiment and safety stations, (n) 446
U. S. Naval Consulting Board's Industrial Preparedness Comm. ..... (n) 238
U. S. Naval Eng. Expt. Sta., Annapolis—Torsional endurance and impact machines ... *283
U. S. Navy, Modernizing specifications in—Norfolk shop 512, Designing engineers wanted 1010, Contracts on cost-plus-a-percentage basis 1143, Large chain cables power-forged at Boston yard. Coburn *1113, Flagpole design (n) 804, Geared turbines (n) 818, Wants contractors' advice on contract provisions (n) 1154, Bids for battle cruisers opened 1143, (n) 1154, Ship canals to aid in national defense 1188, Petroleum-deposits reservation ..... (n) 1202
U. S. Public Buildings Comm. for D. C. .... (n) 141
U. S. Public Health Service as consulting engineers. Glennan 37, Norcross 180
U. S. Public Land Survey section corners, Designating Rankin ..... (n) *560
U. S. Reclamation Service. See "Irrigation."
U. S. River and Harbor bill. Ripley 84, St. Paul harbor changes 332, Limiting flow, Chi. drainage canals ..... (n) 93
U. S. rivers—Flood-Control bill and Miss. levees. Dabney 228
U. S. road-aid act 82, 521, (ns) 94, 141, 238, 381, 1054, Mich. to make most of appropriations. Thomas 795
U. S. shipbuilding development ..... (n) 1057
U. S. Steel Co.'s Duluth plant 138
U. S. Sundry Civil Appropriation bill .... (n) 142
U. S. the world's reservoir of capital; Loree's views 1093
U. S. Treasury, Another "public buildings" raid on 1238
U. S. Weather Bureau evaporation studies. Kadel, Abbe *200
Universities. See "Engineering schools," "Education."
Upper Hudson Stone Co. centrifugal pumps. *508
Upper Miss. River impvt. Asso. 985
Utah—Howe truss highway bridge with composite chord *559
Utah Power & Lt. Co. reservoir, pumps, etc., *67, 83, *98, *172, 178, *408
Utah roads 483, Earth handled cheaply in grading *28
Utilities. See also "Public," "Rates" and cross references.
Utilities, The city and its. Cooke 816

V

Valuation. See also "Rates."
Valuation, Beaver Val. Water Co ..... (n) 333
Valuation, Chattanooga water-wks. ..... (n) 141
Valuation—Depreciation. Barker 1167, 1212
Valuation discussed by A. I. E. E. 962
Valuation—Inventories and histories. Low, 181
Valuation, Obsolescence in. Harshman 842, 854
Valuation reports, First complete ry. 892, Erratum ..... (n) 1001
Valuation surveys, Railroad, may be made useful. Dunlap 26
Valuation terms, Attempt to standardize—Am. Elec. Ry. Asso. report by Young 787

Page

Valuation, Traders Paper Board plant. Higgins *600
Valve chambers, Concrete, Salt Lake Cy..... *66
Valve corrosion, Panama locks..... 1005
Valve for dry-pipe sprinklers, Natl. Fire Ext. Co.'s ..... (n) 240
Valve, Replacing reservoir scour, against pressure, N. S. W. Kendall..... *173
Valves, Automatic flap, Calif. Corrugated Culvert Co.'s ..... (n) *676
Van dyke print white, Marking. Godfrey 1141, (n) 1001
Van Scoyoc, H. S. Toronto-Hamilton road 911
Vaughan, G. W. Track tampers..... *946
Veatch, F. M. Kan. experience in running small sewage works..... 64
Velocity, Water. See "Hydraulics," "Water measurement."
Ventilation. See "Heating and ventilation."
Venturi flume, U. S. Dept. Ag..... *270
Venturi meter, Air chamber protects, from pulsations. Doane *1184
Venturi meters inaccurate on lively lines. Hazen 293, Ledoux, Gore..... 514
Vermeule, C. C. Croton watershed..... 664
Vermilion Co., Ill., roads..... *209, *248
Vernon, S. B. Building Albany sewage pump house and grit chamber..... *738
Vetter, W. Moment of inertia of lenticular section *995
Viaduct. See also "Bridges."
Viaduct, Brooklyn-Brighton, Cleveland—Durax pavement ..... (n) 127
Viaduct, Colfax-Larimer concrete, Denver—Raising settled bent..... *221
Viaduct, Concrete side-hill, for brick highway, Dunham road, Cuyahoga Co., O..... *352
Viaduct, Concrete, vs. fill for street elevation, Astoria. McClean 325
Viaduct, Effect of hurricane on Corpus Christi, *815, (n) 430
Viaduct, Detroit-Superior, Cleveland—Progress *234
Viaduct Galveston causeway (ns) 1153, 333, (erratum n) 1193
Viaduct, Hopple St., Cincinnati..... (n) 864
Viaduct, Park Ave., Cincinnati..... (n) 674
Viaduct, Popolopen steel..... *337
Viaduct, Riverside Drive, Buckling columns give trouble in jacking up..... *869
Viaduct, So. Ry., Broad Riv.—Concrete instead of steel..... 1043
Vibration, Opinions on building, collected by Aberthaw Const. Co..... 624
"Vibrolithic" concrete paving..... *1120
Viscosity, Influence of, in pumping crude oil. Collins 22
Vocational guidance. Buff 565, Ruggles 713, Holden 873
Von Mueller, C. Flat-slab design..... 614

W

Waddell, J. A. L. "Bridge Engineering," 174, 1188
Wages. See "Labor."
Wagon. See also "Motor vehicles."
Wagon loader and excavator, Koehring..... *495
Wagon loader for roadwork, Barbeau & Wering's Albrecht dragline..*78, (erratum n) 469
Wagon loader, Home-made horse-operated, St. Morris' of New Mex..... *361
Wagon loader with belt conveyor, Burch (n) *336
Wagon, Dump, cable system. Owen..... *272
Wagon, Shop, for water meters..... *447
Wagons, Dump, superior to carts, distributing concrete 79
Wagons, Snatching, in two lifts, Underwood Service Bldg. cellar, N. Y..... *560
Wagons, Snatching, out of pits, N. Y. Subway. Fouby *124
Walen, E. D. Testing cloth..... *135
Walker, F. B. Cascade Range tunnel..... *1190
Walker Mfg. bldg. roof slabs..... *1173
Wall. See also "Retaining."
Wall, Concrete, tips, Madison reservoir..... *476
Wallingford, Conn.—Municipal lighting plant, (n) 1053
Wallis, R. S. Street signs..... *16
Wang, C. C. Govt. railways, China..... 540

WAR TOPICS
—Armor-plate plant—Cost accounting..... 83
—Battleship "Tennessee," Electric..... (n) 279
—Bridge, Cernavoda, Roumania..... *861
—Engineer Corps, Ill., on Mex. border..... 1035
—Engineer Corps, U. S. A., Expanding..... (n) 530
—Engineer Officers' Reserve Corps—Act effective 92, Organizing the Corps—Information 327
—Engineer, 2d Lieutenants appointed..... (n) 1202
—Engineers, Using, in present military emergency. Black 36, Opportunities for civilians to become engineer officers. Black 615
—Engineers—West Point graduates..... (n) 531
—Explosion, Munitions, N. Y. harbor *236, 275
—Field-artillery service should attract engineers; gun-pointing problems, etc. McCullough 353, Gregg..... *564
—Flag-pole design, U. S. Navy..... (n) 804
—Locomotives, Baldwin-built French..... *215
—Naval Consulting Board's Industrial Preparedness Comm. ..... (n) 238
—Naval contracts on cost-plus-a-percentage basis 1143, Navy wants contractors' advice on contract provisions..... (n) 1154
—Naval designing engineers wanted..... 1010
—Naval Eng. Expt. Sta., Annapolis—Torsional endurance and impact machines..... *283

Page

WAR TOPICS—Continued
—Naval ships—Power loss in propellers due to rough surface. McEntee..... 1173
—Naval specifications, Modernizing—Norfolk shop 512
—Navy—Battle-cruiser bids opened 1143, (n) 1154
—Navy, Petroleum reservation for..... (n) 1202
—Navy Yard, Boston, Chain cables power-forged at. Coburn..... *1113
—N. Y.—22nd Engineers—Camp Whitman water-supply *498, Make good 513, Information ..... (n) 190
—Nitrate plant, Govt., locations 155, 415, (n) 190
—Patents and war. Haynes..... 1239
—Ponton bridges, U. S. Army. Barbour..... *156
—Post-bellum influx unlikely..... 563
—Railway preparedness for troops..... (n) 1011
—Range finder and clinometer. Young..... *1183
—Ship canals to aid Navy in national defense; Capt. Niblack's views..... 1188
—Steel production; business prosperity..... 1237
—Turbines in Navy, Geared..... (n) 818
—Water-supply preparedness. Saville..... 85

Warehouse, Mullen & Buckley, Far Rockaway, partly wrecked by fire or explosion..... *956
Warehouses on terminal piers for Camden..*1150
Warnecke, W. H. Rock slab pinned to save bridge *358, 367
Warner, F. T. Concrete tracks for earth road *469, *714
Warning. See "Signal."
Warren, L. G. Tunnel grouting..... *702
Washington Co., Wash., rods, Experience in paving. White 844
Washington, D. C.—Study of garbage, rubbish and ashes. Osborn 294, *348, Capitol terraces made waterproof *629, D. C. Public Buildings Comm. (n) 141, Potomac bridge plans ..... (n) 332
Water boards, Educate the..... 466
Water-brake design. Herschel..... 378
Water conduit, Longest, Coolgardie..... (n) 680
Water-Conservation Comm., Penn..... (n) 1106
Water-consumption record, Phila..... 478
Water consumption reduced, Northampton, Mass. ..... (n) 203
Water, Deep-well condensing—Layne & Bowler installations 779
Water-evaporation studies, Weather Bureau. Kadel, Abbe *200
Water feed for concrete mixers, Lakewood, (n) *384
Water flow. See also "Water measurement," "Hydraulics."
Water flow increases with rising temperature. Butcher *326, 611
Water flow into wells—Approximate theory. Werenskiold *256
Water, Irrigation. See "Irrigation."
Water-level recorder, Sensitive. Hoff *974, *1080
Water lifts sand to filters from cars, Toronto. Gore *803
Water losses, city systems. Barbour 958, N. E. W.-W. Asso. report. Hazen 960, Ed.... 951

WATER MAINS
See also "Pipe," "Aqueducts" and water topics generally
—Baltimore main burst ..... (n) 674
—Baltimore mains, Finding leaks and weaknesses in; use of "aquaphone"..... 991
—Bayonne supply main break..... (n) 141
—Breaks—N. E. W.-W. Asso. discussion..... 570
—Butte steel and wood mains (correction n) 134
—Cincinnati rules on extensions..... (n) 1092
—Cleveland—Laying water main with locomotive crane ..... (n) *1042
—Concrete main, Kan. Cy., Mo..... (n) 578
—Joint for water mains, Why not a better? 951, N. E. W.-W. Asso committee reports, etc. 570, 958, 960
—Malone, N. Y., supply main sustains capacity for 28 years..... 461
—Minneapolis—Miss. Riv. plays with pipe-laying job *1038, Pipe laying with trenching machine (n) *224, Main broke... (n) 1057
—Pittsburgh mains burst..... (n) 674
—Portable water mains, Street flushing with —Baker, Ore., and Buffalo Mun. Equip. Co.'s devices *659
—San Diego submarine main, Anchoring..(n) 852
—Staten Isl. main, Connecting Narrows siphon to..... *782
—Wood-main service connection, Madison-Anson *542

WATER MEASUREMENT
See also "Hydraulics."
—Detroit old brick intake tunnel shows low Kutter factor. Maury, Horton..... *460
—Flow meter, Variable-slot, Spray Engineering Co.'s. Vaughan..... (n) *480
—Flume intakes and outlets, Hydraulic principles of. Norton *541, Kennison 1096, Hinds *1097
—Flume, Measuring, U. S. Dept. Ag..... *270
—Meter rates, Mont. standard..... 648
—Meters for Phila. 710, Davis 720, Trautwine 761
—Meters, Setting 10,000, Wilmington, Del.; shop-wagon *447
—Meters, Slide rule for regearing, Bock's, St. Louis *800
—Meters, What they will do—Woonsocket, R. I..... 465
—New Eng. W.-W. Asso.—Cost-of-service rates to the front 998, Suggestion for making rates..... 999

Page

WATER MEASUREMENT—Continued
—Northampton, Mass., reduces consumption by pitometer and inspection..... (n) 203
—Oil in reservoirs, Measuring..... *1066
—Penn. companies cannot require meters, (n) 189
—Pressure gage, Lanham "Manograph" recording differential, made by Water-Wks. Equip. Co..... (n) 96
—Pump test, Difficult centrifugal, with pitot tube, West Sacramento; switching device reversing manometer connections *8, Gregory 180
—Rate decision—Dentist's bowl..... (n) 926
—Redondo, Calif., Meters give remarkable results at. Bowen..... 910
—Reservoir-mouthpiece expts. Univ. of Penn. Pardoe *520
—River survey, Ore. State Engineer's, guides water adjudicators. Cupper..... 5
—Venturi meter, Air chamber protects, from pulsations. Doane..... *1184
—Venturi meters inaccurate on lively lines. Hazen 293, Ledoux, Gore..... 514
—Water-level recorder, Sensitive—"Evaporimeter" of Irrigation Branch of U. S. Office of Public Roads and Rural Engineering. Hoff *974, Irrigation field laboratory, Denver..... *1080
—Water losses, city systems..... 951, 958, 960
—Weir flow meter, Bailey impvd..... (n) *96
—Weir formulas, New method of deriving, Univ. of Mich. Running..... *695
—Weir, Standard irrigation, Dept. of Ag. Cone *222

WATER POLLUTION AND PURIFICATION
See also "Water-works," "Sewers."
—Am. Pub. Health Asso. reports..... 858
—Baltimore Water-Dept. organization..... *790
—Boiler-water purifier, "Economo"..... (n) 1012
—Bronx Valley sewage purification, Govt. orders ..... (n) 530
—Brookline iron-removal plant—Coke tricklers; covered sand filters and reservoir; sand-washing device..... *448
—Can. boundary—Buffalo sewage disposal, (n) 1202
—Chi. supply, sewage pollution..... (n) 430
—Chlorine, Liquid, U. S. output..... (n) 437
—Clarksburg, W. Va.—Changing from alum to iron at filters. Boynton..... 927
—Cleveland water-supply to be purified and softened—Filter plant *732, Arch collapse, *186, (n) 141, Will jacket clearwater basin with reinforced concrete (n) 1009, Foundation settlement 1095, *1099, Quick repair bids..... 1150
—Code for sanitary control of waterways, Proposed, Am. Pub. Health Asso..... 876, 901
—Council Bluffs settling basins, Hydrated lime pays at; use of alum. Thornell..... *456
—Detroit experimental filtration plant..... (n) 578
—Fall River investigation..... (n) 674
—Feeder for water-works chemicals, Guantt dry ..... (n) 96
—Filter standards, Mechanical—A. S. M. E. report by Fuller..... 1148
—Filters, Drifting-sand, Toronto *561, *566, Water lifts sand to filters from cars, Gore *803, Paraffin-wax coating for tanks and pipes (n) 464, Mechanical agitation unsuccessful. Nordell..... 856
—Filters, Loss of head in mechanical, due to micro-organisms 673
—Fox Riv., Ill., pollution case ended..... (n) 189
—Indianapolis typhoid..... 562
—Minneapolis wins filter suit..... 951, 960
—Montreal Water Co. makes its own alum and chlorine..... 477
—N. Y. Cy. supply, Chlorinating—Dunwoodie plant. Coffin..... *438
—Oyster treatment with hypochlorite. Wells, (n) 285
—Providence supply, To filter..... 427
—St. Louis, Filters and typhoid at. Potter.. 1047
—St. Paul water-supply copper-sulphate treatment. Huff 104
—San Diego water, Clarifying..... (n) 189
—Sanitation on watersheds—Newark, Jersey Cy., New York..... 813
—Sewage-treatment effluent purity—Typhoid transmission by cattle. Potter..... 855
—Springfield, Mass., Intermittent excess coagulant—Sulphate of alumina. Lochridge. 617
—Sterilizing camp or household water... (n) 224
—Typhoid from water, accident..... 442
—Water purification safer than sewage treatment; disposal at Davenport; Alvord's views 1237
—Water refining for cities, Sedgwick on..... 513
—Wilmington, Del., sand filter..... 1008

WATER POWER
See also "Dams," "Reservoirs."
—Bear Lake reservoir and pumping station, Utah Power & Lt. Co.'s; pumping water for power..... *67, 83, *98, *172, 178, *408
—Canadian resources..... (n) 1003
—Chi. drainage-canal power, Joliet dam—Bids ..... (n) 237
—Cross Cut station. Gaylord..... 86
—Dam—Stopping underground leakage..... *459
—Draft-tubes, Forms for heavy concrete, Ebro Co.'s Seros development, near Lerida, Spain. Braun..... *76
—Forests, Power in national..... (n) 1200

Page

WATER POWER—Continued
—Grand Canyon dam-site surveys, *306, (erratum n) 371
—Legislation in Congress, engineers' action, etc. .....367, 999, (ns) 190, 430
—Lewiston, Me., pumping by water power...*441
—Long Sault Rapids, N. Y. recovers....(n)1200
—Mass diagram. Butcher.....*376
—Montreal municipal project condemned by engineers .....1043, *1048, (n) 1010
—Niagara—To save Horseshoe Fall. Harper *1135
—Ont. Hydro-Elec. power shortage (n) 233, To enlarge system 478, To develop Chippewa Creek.....(n)1056
—Pac. G. & E. Co.—To raise Spaulding dam.*328
—Rochester (N. Y.) Ry. & Lt. Co.—Developing more water power on Genesee.....*821
—St. Gothard Ry. electrification.....(n) 622
—Scouting for water power. Showalter..... 389
—Seneca Falls—Power plants moved for N. Y. Barge Canal; water rights consolidated; Barge Canal power plant.....*145
—Turbine specific-speed diagram. Babcock's.*707
—Turbines with Fink gates, Brakes for. Horton 181
—Turners Falls canal-lining slide.....*1031, 1046
—Waterwheel for irrigation, Philippines.....*409
—Yadkin development, N. C., of Aluminum Co. of Am.'s Tallassee Power Co....*917, 951

Water purification. See "Water pollution and purification."
Water refining for cities, Sedgwick on..... 513
Water-service pipes, Macbee cement-coated, (n)*724
Water storage, Naugatuck Riv.....(n) 626

WATER-SUPPLY
See also other "Water" topics, "Well," "Pumps," cross-references from "Waterworks," etc.
—Aurora, Ill., well-unit water supply.....*1122
—Beaver Val. Water Co. appraisal, Penn..(n) 333
—Cleveland supply purification. See "Water pollution and purification."
—Electro-pneumatic outfit, Hill.....(n)*480
—Hartford water case—Compensation in kind. Saville 246
—Little Rock company need not test wells, (n) 478
—Madison-Anson, Me., supply.....*542
—Mass diagram. Butcher.....*376
—Militia-camp water supply—Camp Whitman, N. Y.....*498, 513
—Mont. standard rate forms..... 648
—N. Y. Cy. (See also "Aqueducts—Catskill")—When surplus changes to deficit, 367, Chlorinating the supply. Coffin, *438, Correcting Croton water-shed area. Brush 576, Wegman, Vermeule 664, Waterproofing drawings 808, 1037, Rock tunnel 18 miles long.....*1008
—Penn—Stream-flow conservation (n) 827, W.-S. Comm. report (n) 893, Conservation Comm.....(n)1106
—Phila., Meters to save 710, Davis 720, Rates. Trautwine..... 761
—Preparedness, Water-supply. Saville..... 85
—Providence supply, To filter..... 427
—Rate decision—Dentist's bowl.....(n) 926
—San Diego dams. See "San Diego."
—San Francisco—Hetch-Hetchy dam site....*137
—Sanitation on watersheds—Newark, Jersey Cy., New York..... 813
—Seattle, Water for a million people..... 42
—Sioux Cy. booster pumping station for supply to suburb of Morningside.....1017
—Snow, Melted, supplies arid district, Ariz., *435, 467
—Tunbridge Wells, Eng.—Lining wells.....*150

Water tunnel, Cleveland—Methods *360, 1038, (n) 382, Explosion.....187, 236, 380
Water tunnel under Cuyahoga Riv., Cleveland—Sinking shaft *374, Tunneling in firm clay with compressed air.....*1220
Water tunnel, Milwaukee Shore—Surveys, *657, Grouting with pumps *702, Concreting methods *794, Steel-lined material chute, (n) *708, Economizing compressed air..(n)1041
Water tunnel, Old brick, Detroit, shows low Kutter factor. Maury, Horton.....*460
Water tunnel, 18-mile N. Y.....*1008

WATER-WORKS
See also other "Water" topics and "Aqueducts," "Dams," "Reservoirs," "Pipe," "Pumps," "Well," "Tanks and standpipes."
—Am. Water-Wks. Asso. convention—Broader vision—Electrolysis and fire protection, 33, Paper 104, Iowa and Ill. sections, 791, 1017, (ns) 383, 675, 769, 1091, N. Y. sec. 813, Four-states meeting, Wilmington, Del.....1008
—Artistic touches for simple water-wks. structures—Shrewsbury and Bellevue, Mass. .....*433, (n) 616
—Atlanta, Ga., improvements.....(n)1202
—Aurora, Ill., well pumps.....*1192
—Baltimore Water-Dept. organization.....*790
—Birmingham, Ala., purchase.....(n) 478
—Chi.—Cast-iron pipe inspection.....(n) 700

Page

WATER WORKS—Continued
—Chattanooga water-wks. valuation.....(n) 141
—Cleveland intake tunnel—Methods *360, 1038, (n) 382, Gas explosion....187, 236, 380
—Cleveland tunnel under Cuyahoga Riv.—Sinking shaft *374, Tunneling in firm clay with compressed air.....*1220
—Denver water-wks. municipal-ownership legality .....(n) 333
—Detroit old brick intake tunnel shows low Kutter factor. Maury, Horton.....*460
—Educate the water boards; water waste..... 466
—El Paso—Air-lift pumping.....*204
—Electro-pneumatic outfit, Hill.....(n)*480
—Fire rates, Will improvement in water-wks. reduce?—Maury's question, Wilmette, Ill. 901
—Forestry, Profit in water-wks., Pennichuck Water Co.'s, Nashua, N. H.....*472
—Intake screens wanted.....(n) 664
—Lawrence, Kan., impvts.....(n) 46
—Lewiston, pumping by water power.....*441
—Mass. Met.—Air chamber protects Venturi meter from pulsations. Doane.....*1184
—Mass. Met.—Bellevue tank.....*434
—Milwaukee Shore tunnel—Surveys *657, Grouting with pumps. Warren *702, Concreting methods. Warren *794, Steel-lined material chute (n) *708, Economizing compressed air.....(n)1041
—Montreal centrifugal pump. Gibson, Burford 133, Peterson..... 835
—Nashville water-wks. supt. (n) 238, Water-wks. impvts. .....(n)1202
—New Eng. Water-Wks. Asso.—Brackett medal *478, Progress 562, Portland meeting 570, Service pipes 594, Intermittent-excess coagulant, Springfield 617, Water-main joints 951, Water losses 958, 960, Meters and rates 998, 999, Nominations, (n) 867
—New Orleans—Earl's report—Making water consumers pay for sewer service 512, Gideon 1193
—N. Y. Cy. (See also "New York City," "Aqueducts—Catskill")—When surplus changes to deficit 367, Chlorinating the supply. Coffin *438
—N. Y. Cy.—Early relics.....*1243
—Salt Lake Cy. concrete hydrant and valve chambers 66
—San Diego—Restoring after flood.....*980
—Santa Monica, Calif., buys water-wks...(n) 577
—Sioux Falls, S. D., impvts.—Reservoir with groined-arch floor; wells; pumping plant..*840
—Well casing, Vitrified pipe for, Medway and Barnstable, Mass.....*461
—Wheaton, Ill., Producer-gas engines drive pumps *602
—Wilmington, Del.—Setting 10,000 meters; shop-wagon *447, Water-wks. changes..1008

Waterproof, Capitol terraces made.....*629
Waterproof coal pits.....*635
Waterproofing drawings. Bell 808, Salmon..1037
Waterproofing Gem Lake dam with cement gun *1159
Waterproofing slab-deck bridge.....*1003
Watersheds, Sanitation on..... 813
Waterwheel, Light home-made, for irrigation, Philippines, Haley.....*409
Watt, D. A. Troy dam *408, *492, *533, *609, 613, Discussion on concrete.....864, 949
Wayne, Penn.—Sewage-disposal works after nine years. Hill.....*1163
Weather Bureau. See "U. S."
Weather forecasts—Smithsonian disclaimer, (n) 371
Weatherford, J. H. Grade-crossing elimination, Memphis bridge terminals.....*160
Weed killing, Chemicals for. Chipman.....1047
Wegmann, E. Croton watershed..... 664
Weir flow meter, Bailey impvd.....(n) *96
Weir formulas, New method of deriving, Univ. of Mich. Running.....*695
Weir, Sacramento.....(errata n) 325
Weir, Standard irrigation, Dept. of Ag. Cone.*222
Welcker's extensograph measurements.....*1102
Welding. See also "Cutting."
Welding, Cylinder repaired by autogenous, McGrath *77
Welding dredge dipper with Thermit. Rosselle .....(n)*320
Welding of Phila. pumping-engine crank with "Thermit" 1140
Well and pumping system, Restoring flooded, San Diego. Francis.....*980
Well, Artesian, to float dredges.....(n) 80
Well casing, Vitrified pipe for.....*461
Well, Deep, condensing water—Layne & Bowler installations..... 779
Well, Dynamiting deep, to increase flow. Alderson 1137
Well, Lining 114-ft., with precast concrete rings, Ft. Worth & Denver Cy. Ry., at Clarenden, Tex.....*688
Well-unit water-supply, Aurora, Ill.....*1122
Wellman-Seaver-Morgan drafting room.....*218
Wells, Flow of water into—Approximate theory. Werenskiold.....*256
Wells, J. P. Effect of seasonal rainfall on annual runoff.....*792
Wells, Lining, with cast iron and cement grout, Tunbridge Wells, Eng. Maxwell....*150

Page

Wells, Sioux Falls, S. D.....*840
Wells, Tidal flow affects artesian.....(n) 479
Wells, Water company need not test.....(n) 478
Werenskiold, N. Flow into wells.....*256
West, Construction and maintenance of roads in arid.....*481
West Va. flood.....321, 331, 381, *428
Western Wheeled Scraper Co.'s dump-cars...*581
Westinghouse-Macalpine gear..... 807

WHARVES AND DOCKS
See also "Harbors," "Piles."
—Albany municipal dock.....(n) 540
—Am. Internatl. Terminal Co.....(n) 94
—Astoria, Ore., municipal docks. Newell....*697
—Camden, N. J., Warehouses on terminal piers for.....*1150
—Coal-handling method. Gilpin..... 169
—Concrete-dock patent upheld, Ferguson-Carey, of Cleveland Dock & Eng. Co.... 961
—Dry-dock coffer-dam fails, South Boston, 237, (n) 429
—Dry-dock, Subaqueous rock excavation for, Grand Trunk Ry., Prince Rupert. Phelps.*171
—Jacksonville municipal docks open..... 722
—London deep-water dry-dock.....(n) 286
—N. J. freight terminal, Bayonne, for port of N. Y. *90, 862
—N. Y. Cy.—North River piers, 46th St., completed inside huge coffer-dam..... 45
—Ore dock, Ashland concrete, of Minn., St. P. & Sault Ste. M. King.....*242
—Panama—Balboa dry-dock 1004, Resurfacing floor *755, Dry-dock rules (n) 842, Cristobal pier .....(n) 911
—Phila. terminal ry.; new piers *260, Continuous package elevators. Edsall.....*406
—Pier, Concrete ocean, in form of hollow triangle, Redondo Beach, Calif. Roberts.*518
—St Louis municipal dock.....*1216
—St. Louis river terminals..... 216

Wheat, Can., routes to seaboard.....*601, 703
Wheaton, Ill.—Producer-gas pumping plant, *602, Water-tower tank.....*888
Wheel, Car, flanges and frog clearances..... 34
Wheeler, W. S. Not so dry in Payta..... 371
Wheelways, Concrete for earth roads. Warner *469, Brick ones in Holland. Spaander.*711
White, A. E. Tube experiences.....87, 88
White, D. H. Paving Wash. Co. roads..... 841
White Plains, N. Y.—Concrete paving.....*1120
Whited, W. Bridge skew.....(n) 995
Whitney, H. B. Cost of night and day work. 506
Whittemore, D. J., Death of *140, His services to engineering. Tratman..... 182
Wichita, Kan.—Pavement joints..... 905
Wight, F. C. Five days on Mississippi.....*1114
Wildwood, N. J.—Sewage works.....*1243
Wiley, R. Wanted: contractors..... 616
Wilkinson, T. Will traffic follow river impvt.? 985
Williams, W. N. Y. water report..... 377
Wilmington, Del.—Setting water meters *447, Water-Wks. changes.....1008
Wilmington, N. C.—Fed. Bldg. piles.....*1207
Wilson, W. M. Engineering misfits, 388, 414, 565, 713, 873
Wind cripples Kankakee Riv. bridge. Older..*638
Windmill, Dutch drainage.....*773
Window, Store Imprt. Co.'s non-reflecting.(n)*916
Winfield, Kan.—Reservoir failure.....*444
Winnipeg, Man.—Aqueduct cracks..... 716
Winter concreting, Magnolia cutoff.....*269
Wire, Saw-toothed stress-strain curves of bronze. De Forest..... 87
Wireless towers, Erecting Canacao.....(n)*320
Wisconsin telephone-conduit trenching.....*1068
Withington, C. Incinerator tests.....1009
Witmer, F. P. Que. rocker stresses..... 760
Wolf, A. M. Flat-slab design..... 614
Wood. See "Timber," "Pipe," "Pavements," "Flooring."
Woodman, J. C. Refuse incinerator, Queens Borough, N. Y. Cy.....*598, 1009
Woonsocket, R. I.—Water meters..... 405
Worcester, Mass.—Flushing streets from trolley cars *1205
Words. See "Nomenclature."
Words, Permutit Co.'s patented.....(n) 671
Workmen. See "Labor," "Compensation."
Wrench, Cochrane quick-acting.....(n)*1248
Wrench, Mechanical Specialties Co.'s "Eagle claw" .....(n)*288
Wulff, E. J. J. Cost of concrete and other permanent road pavements.....1240

X

X-ray photos. of concrete..... 563

Y

Yadkin development nearing completion..*917, 951
Young, C. R. Range finder and clinometer..*1187
Young, G. J. Excavator in Klondike..... *74
Youngstown, O.—River-control reservoir *1084, Youngstown Sheet & Tube office building concreting *174

Z

Zoning progress, N. Y. Cy. 225, Regulations, Ford 407
Zoning system, Sacramento.....*444

ENGINEERING LITERATURE

Page

EDITORIAL

Monthly guide to engineering books and pamphlets 322

CORRESPONDENCE

Earth Pressure, Retaining Walls and Bins. Cain, Godfrey 744
Indexing technical literature. Wilson..... 744

MISCELLANEOUS

Eleven worthy volumes—International Engineering Congress 116
Wiley's index-card book announcements..(n) 314
Geol. Survey maps of U. S.....(n) 314
Reviews of tech. books. Fleming..... 550
Engineers as readers and writers of fiction. Fleming 940
Making engineering libraries of great benefit. Walker 550

BOOKS REVIEWED

Alternating-Current Phenomena, Theory and Calculation of. Steinmetz..... 944
American Year Book. Wickware..... 310
Belting, Power Transmission by Leather. Kent 944
Bins, Earth Pressure, Retaining Walls and. Cain 308, 744
Bituminous Materials, Laboratory Manual of Hubbard 1179
Brant, Mason, Strange Cases of. Hopkins... 310
Brick-pavement specifications, Standard. Natl. Paving Brick Mfrs.' Asso...(n) 945, 1239
Bridge Engineering. Waddell.....1174, 1188
Bridge Floors, Highway. Spofford.....(n) 314
Bridges, Concrete, General Specifications for. Watson 117
British Standard Specification for Salt-Glazed Ware Pipes. Robertson..... 311
Chemistry, Industrial. Thorp..... 554
Chemists' Handbook, Metallurgists' and. Liddell 311
City Charters, Model, and Municipal Home Rule. Natl. Municipal League..... 314
City Planning. Nolen..... 552
City Planning. Robinson..... 552
City Planning the Modern. Lewis..... 552
Civic Surveys, Schedule of Comey.....(n) 315
Clay—Plastic Flow. Bingham.....(n) 750
Coal: Its Economical and Smokeless Combustion. Cosgrove 121
Concrete Bridges, General Specifications for. Watson 117
Cost Accounting. Baugh..... 121
Cost Keeping for Contractors. Walker.....1180
Depreciation, Principles of. Saliers..... 117
Descriptive Geometry Practical. Smith..... 310
Earth Pressure, Retaining Walls and Bins. Cain 308, 744
Electric Power Transmission, Pole and Tower Lines for. Coombs..... 122
Electric Railway Engineering. Harding, Ewing 122
Electrical Design, Principles of. Still..... 943
Electrical Engineering First Course. Berg, Upson 311
Electricity, Applied, for Practical Men. Rowland 944
Electricity, Machine-Shop. Clewell..... 942
Electricity—Theory and Calculation of Alt.-Cur. Phenomena. Steinmetz..... 944
Elevators. Jallings 119
Engineer in War. Bond..... 311
Engineering as a Profession. Ketchum..... 313
Formulas and Tables for Engineers, Handbook of. Peirce, Carver.....1180
Gaillard, D. DuB. By L. E. Smith..... 553
Gas Congress, Internatl., Proceedings..... 314
Gas-Engine Ignition. Norris, Winning, Weaver 309
Highway Engineering, Elements of. Blanchard 745
Highway Engineers, Handbook for. Harger, Bonney 745
Hydraulic Flow Reviewed. Barnes..... 746
Hydraulics. Daugherty 116
Illinois Public Service Comm. Bull..... 308
Industrial Arts Index. Potter, Teich, Craig, eds..... 313, 744
Industrial Chemistry. Thorp..... 554
International Eng. Cong. papers on Panama Canal. Goethals et al..... 309
International Year Book. Colby..... 310
Iron and Steel Works Directory. Am. I. & S. Inst., McCleary, Sec..... 312
Irrigation in U. S. Teele..... 117
Irrigation Management. Teele..... 117
Lighthouse Service, U. S.....(n) 315
Lime, Hydrated. Lazell..... 312
Logarithm tables, Chappell's..... 313
Los Angeles Aqueduct, Final Report on Const. of 750
Mathematical Tables, Five-Figure. Chappell 313
Mechanical Engineers' Handbook. Marks..... 747
Metallurgists' and Chemists' Handbook. Liddell 311
Minnesota Highway Journal.....(n) 554
Mosquito Control in Panama. LePrince, Orenstein 748
Municipal Administration. Munro..... 941
New Eng. Water-Wks. Asso. "Transactions" and "Journal".....(n) 943
N. Y. City—Standard Specifications for Personal Service 942
New York State Highway Bull..... 312
New York State map of highways and historical points .....(n) 555
Oregon Water Resources, Control, etc. Lewis, Cupper 1180
Ozone. Vosmaer 941
Panama Canal, Construction of. Sibert, Stevens 309
Panama, Mosquito Control in. Le Prince, Orenstein 748
Panama Canal—Int. Eng. Cong. papers. Goethals et al..... 309
Passenger Terminals and Trains. Droege...1179
Parks and Park Engineering. Lyle..... 313
Personal Service, Standard Specifications for, N. Y. Cy..... 942
Petroleum Withdrawals and Restorations. Ball 554
Physics, Concise Technical. Arnold..... 942
Plastic Flow Investigation. Bingham....(n) 750
Pole and Tower Lines. Coombs..... 122
Power-Plant Apparatus Test Rules, A.S.M.E. 314
Public Health, New. Hill..... 121
Public Health Protection, Am. Hemenway.. 311
Pumps, Centrifugal, and Suction Dredgers. Sargeant 940
Railroad Transportation, Principles of. Johnson, Van Metre..... 748
Railroad Valuation and Rates. Wymond.... 118
Railway Materials, Some Foreign Specifications for. Burgess, Merica, Bureau of Standards 554
Railway Monopoly and Rate Regulation. McFall 121
Railways—Passenger Terminals and Trains. Droege 1179
Rainfall Data. Reed, White, Univ. of Calif., (n) 314
Rate-Making, Value for. Floy..... 120
Rate Tables, Standard Impvd., for wages. Marshall 312, 944
Retaining Walls and Bins, Earth Pressure. Cain 308, 744
Road Building Conference, Proceedings of Second Natl. 310
Road, The American. Tucker..... 745
Roads and Pavements, Const. of. Agg..... 745
Roads—N. Y. Highway Bull..... 312
Rochester, N. Y., City Govt..... 943
Sacramento Water-Supply Report. Hyde, Wilhelm, Miller 749
Safety Methods and Devices. Cowee..... 749
Sand and gravel production. R. W. Stone (n) 751
Scaffolds, Safety Engineering Applied to Travelers Ins. Co..... 119
Sewer Pipe Standards, Brit. Robertson..... 311
Sewerage Practice, Am. Metcalf, Eddy.....1181
Sheds, Practical Design of Steel-Framed. Spencer 119
Steel and Cast Iron, Metallography of. Howe 312
Steel and Its Heat Treatment. Bullens..... 309
Steel, Metallurgy of. Harbord, Hall..... 553
Steel, Physico-Chem Properties of. Edwards 944
Tool Builders, English and American. Roe.. 311
Trust Laws and Unfair Competition. Davies 551
Typhoid Toll, The. Johnson.....(n) 945
U. S. Coast & Geod. Survey Centennial..... 942
U. S. Maps. Geol. Survey.....(n) 314
U. S., Mineral Resources, Reprinted sections from..... (ns) 751, 945
Value for Rate-Making. Floy..... 120
Wages—Rate Tables. Marshall.....312, 944
Water Resources of Oregon, Control, Distribution and Use of. Lewis, Cupper.....1180
Water-Supply. Mason 1181
Water-Supply, Sacramento, Report. Hyde, Wilhelm, Miller 749
Water-Wks Handbook. Flinn, Weston, Bogert 551
Weir studies, U. S. Dept. Ag.....(n) 315
Welding, Antogenous. Natl. Tube Co.....(n) 945

AUTHORS

Agg, T. R. Roads and Pavements..... 745
American Soc. Mech. Eng. Power Test Rules 314
Arnold, J. L. Concise Technical Physics... 942
Ball, M. W. Petroleum Withdrawals and Restorations 554
Barnes, A. A. Hydraulic Flow Reviewed... 746
Baugh, F. H. Cost Accounting..... 121
Berg, E. J. Electrical Engineering First Course 311
Bingham, E. C. Plastic Flow Investigations. 750
Blanchard, A. H. Elements of Highway Engineering 745
Bond, P. S. Engineer in War..... 311
Bonney, E. A. Handbook for Highway Engineers 745
Bullens, D. K. Steel and Its Heat Treatment 309
Burgess, G. K. Foreign Railway Specifications 554
Cain, W. Earth Pressure, Retaining Walls and Bins..... 308, 744
Calif., Univ. Rainfall Data.....(n) 314
Carver, W. B. Formulas and Tables for Engineers 1180
Chappell, E. Five-Figure Mathematical Tables 313
Clewell, C. E. Machine-Shop Electricity.... 942
Colby, F. M. International Year Book..... 310
Comey, A. C. Schedule of Civic Surveys. (n) 315
Coombs, R. D. Pole and Tower Lines..... 122
Cosgrove, J. F. Coal..... 121
Cowee, G. A. Safety methods..... 749
Cupper, P. A. Control, etc., of Oregon Water Resources 1180
Daugherty, R. L. Hydraulics..... 116
Davies, J. E. Trust Laws and Unfair Competition 551
Droege, J. A. Passenger Terminals.....1179
Eddy, H. P. Am. Sewerage Practice.....1181
Edwards, C. A. Properties of Steel..... 944
Ewing, D. D. Elec. Ry. Engineering..... 122
Flinn, A. D. Water-Wks. Handbook..... 551
Floy, H. Value for Rate-Making..... 120
Goethals, G. W. Panama Canal..... 309
Hall, J. W. Metallurgy of Steel..... 553
Harbord, F. W. Metallurgy of Steel..... 553
Harding, C. F. Elec. Ry. Engineering..... 122
Harger, W. G. Handbook for Highway Engineers 745
Hemenway, H. B. Am. Public Health Protection 311
Hill, H. W. New Public Health..... 121
Hopkins, N. M. Strange Cases of Mason Brant 310
Howe, H. M. Metallography of Steel and Cast Iron 312
Hubbard, P. Laboratory Manual of Bituminous Materials 1179
Huette, An American. Marks..... 747
Hyde, C. G. Sacramento Water-Supply.... 749
Jallings, J. H. Elevators..... 119
Johnson, E. R. Principles of Railroad Transportation 748
Johnson, G. A. Typhoid Toll.....(n) 945
Kent, R. T. Leather Belting..... 944
Ketchum, M. S. Engineering as a Profession 313
Lazell, E. W. Hydrated Lime..... 312
LePrince, J. A. Mosquito Control in Panama 748
Lewis, J. H. Control, etc., of Oregon Water Resources 1180
Lewis, N. P. Planning Modern City..... 552
Liddell, D. M. Metallurgists' and Chemists' Handbook 311
Lyle, W. T. Parks..... 313
McCleary, J. T. Iron and Steel Works Directory 312
McFall, J. Railway Monopoly and Rate Regulation 121
Marks, L. S. Mech. Engineers' Handbook.. 747
Marshall, J. W. Rate Tables.....312, 944
Mason, W. P. Water-Supply.....1181
Metcalf, L. Am. Sewerage Practice.....1181
Miller, F. C. Sacramento Water-Supply.... 749
Munro, W. B. Municipal Administration.... 941
National Municipal League. Model City Charter and Municipal Home Rule..... 314
N. Y. Bureau of Municipal Research. Rochester Cy. Govt..... 943
Newell, F. H. Irrigation Management..... 118
Nolen, J. City Planning 552
Norris, E. B. Gas-Engine Ignition..... 309
Orenstein, A. J. Mosquito Control in Panama 748
Peirce, C. A. Formulas and Tables for Engineers 1180
Potter, M. E. Industrial Arts Index.....313, 744
Reed, W. G. Rainfall Data.....(n) 314
Robertson, L. S. Brit. Standard Specification for Salt-Glazed Ware Pipes..... 311
Robinson, C. M. City Planning..... 552
Roe, J. W. English and Am. Tool Builders.. 311
Rowland, A. J. Applied Electricity..... 944
Saliers, E. A. Depreciation..... 117
Sargeant, E. W. Centrifugal Pumps..... 940
Sibert, W. L. Panama Canal..... 309
Smith, L. E. David DuB. Gaillard..... 553
Smith, W. G. Descriptive Geometry..... 310
Spencer, A. S. Steel-Framed Sheds..... 119
Spofford, C. M. Highway Bridge Floors (n) 314
Steinmetz, C. P. Theory and Calculation of Alt.-Cur. Phenomena 944
Stevens, J. F. Panama Canal..... 309
Still, A. Electrical Design..... 943
Teele, R. P. Irrigation in U. S..... 118
Thorp, F. H. Industrial Chemistry..... 554
Travelers Insurance Co. Scaffolds..... 119
Tucker, J. I. The Am. Road..... 745
Upson, W. L. Elec. Engineering..... 311
Vosmaer, A. Ozone 941
Waddell, J. A. L. Bridge Engineering 1174, 1188
Walker, F. R. Cost Keeping for Contractors. 1180
Watson, W. J. Concrete Bridges..... 117
Weaver, W. C. Gas-Engine Ignition..... 309
Weston, R. S. Water-Wks. Handbook..... 551
Wickware, F. G. American Year Book..... 310
Wilhelm, G. H. Sacramento Water-Supply. 749
Winning, R. K. Gas-Engine Ignition..... 309
Wymond, M. Railway Valuation and Rates.. 118
U. S. Dept. Agriculture. Weir studies....(n) 315
U. S. Geol. Survey. U. S. maps.....(n) 314
U. S. Lighthouse Service booklet.....(n) 315
Van Metre, T. W. Principles of Railroad Transportation 748

CONSTRUCTION NEWS—CONTRACT PRICES

Page

A

Albany, N. Y. See "Barge Canal."

B

Baltimore, Md., road..... 290

BARGE CANAL, ALBANY, N. Y.:
- Contract A-1 53
- Contract 19-A 218
- Contract 31 184
- Contract 52 81
- Contract 59 206
- Contract 81 207
- Contract 98 301
- Contract 128 15
- Contract 129 15
- Contract 132 206
- Contract 133 206
- Terminal Contract 19..... 218
- Terminal Contract 26..... 218
- Terminal Contract 53..... 218
- Terminal Contract 101..... 301
- Terminal Contract 261..... 206

Bayhead, N. J., sewer system..... 256
Bogota, N. J., sewer system..... 168
Boston, Mass., paving.....106, 133
Bridge, Nashville, Tenn..... 54

C

CALUMET INTERCEPTING SEWER, CHICAGO, ILL.:
- Contract 5 15
- Contract 6 15
- Contract 7 94

CATSKILL AQUEDUCT, NEW YORK, N. Y.:
- Contract 174 218
- Contract 178 185

Chicago, Ill, sewer system.....15, 94, 183
Clinton, Okla., paving..... 256

E

Elgin, Ill., paving..... 168
Elimination grade crossing, Windsor, Conn... 53
Everett, Wash., water system..... 17

Page

G

Greenwich, Conn., sewage-diposal plant..... 54

H

Highway, Lawrenceburg, Tenn..... 185

HOUSTON, TEX.:
- Sewage-disposal plant 54
- Wharf 218

L

Lawrenceburg, Tenn., highway..... 185
Lexington, Ky., sewage-disposal plant..... 133

M

Milwaukee, Wis., sewer..... 290

N

Nashville, Tenn., bridge..... 54

NEWARK, N. J.:
- Paving 94, 182
- See "Passaic Valley Sewer."

NEW YORK, N. Y.:
- Paving 184
- See "Catskill Aqueduct" and "Rapid Transit System."

P

Park improvements, Westfield, N. J..... 255
Passaic Valley Sewer, Newark, N. J..... 94

PAVING:
- Clinton, Okla. 256
- Elgin, Ill 168
- Newark, N. J.....94, 182
- New York, N. Y..... 184
- St. Louis, Mo..... 207

Philadelphia, Penn., sewer..... 256
Pitman, N. J., sewer system..... 207

PLAINFIELD, N. J.:
- Pumping station 81
- Storm sewers 219, 301

Pumping station, Plainfield, N. J..... 81

Page

R

RAPID TRANSIT SYSTEM, NEW YORK, N. Y.:
- Duct Line 94
- Route 18, 180th St. Yard..... 54
- Section 1, Route 26..... 81
- Section 1B, Route 12..... 207
- Signal Towers 301
- Station Finish 185
- Track Installation 184

Reservoir, Wilmington, Del..... 94
Ridgefield Park, N. J., sewer system..... 184
ROAD:
- Baltimore, Md. 290
- Tucson, Airz 15

S

Sedalia, Mo., sewage-disposal plant..... 301

SEWAGE-DISPOSAL PLANT:
- Greenwich, Conn. 54
- Houston, Tex. 54
- Lexington, Ky. 133
- Sedalia, Mo. 301

SEWER:
- Milwaukee, Wis. 290
- Philadelphia, Penn. 256

SEWER SYSTEM:
- Bayhead, N. J..... 256
- Bogota, N. J..... 168
- Chicago, Ill 15, 94, 183
- Pitman, N. J..... 207
- Ridgefield Park, N. J..... 184

St. Louis, Mo., paving..... 207
Storm sewers, Plainfield, N. J.....219, 301

T

Trinidad, Colo., water pipe line..... 15
Tucson, Ariz., road..... 15

W

Water pipe line, Trinidad, Colo..... 15
Water system, Everett, Wash..... 17
Westfield, N. J., park improvements..... 255
Wharf, Houston, Tex..... 218
Wilmington, Del., reservoir..... 94
Windsor, Conn., elimination grade crossing....53